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THE
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Rail-Road News.

American Railroad Iron.

The Brady's Bend Iron Company, says the Pittsburg Gazette, "are now rolling rails for the Ohio and Pennsylvania Railroad. Their works are situated on the Allegheny river, about sixty five miles above Pittsburg, and they have a contract to supply three thousand tons of rails, weighing sixty pounds per yard, for our Western Railroad. Several hundred tons of rails have already been rolled, and the mill is turning out about forty tons a day. A new rolling-mill has been erected for the express purpose of rolling these rails. Each bar is twenty feet long, and weighs four hundred pounds. We are informed by a gentleman who has recently visited the works, and who is familiar with the manufacture of railroad iron, that rails are exceedingly well made, and highly creditable to the manufacturers. The delivery of the rails will be commenced in a few days, so that there will be no delay in laying the track from this city to New Brighton for the want of iron. It is pleasant to have at least a part of our road laid with American iron, and we are gratified to understand that it is extremely probable that the contracts will be made with the same company for the manufacture of the rails for the extension of the road west of Massillon."

Railroad Accident.

On Friday, last week, one of the cars on the New York and Erie Railroad was thrown off the track by the breaking of the rail, caused, it is said by the severe frost which succeeded the previous mild weather. The car was precipitated down a steep bank into the Delaware near Equinunck, and but for the water, all inside would have been killed. No one, we believe, was killed, but a number were severely wounded, and we regret to say that the one most severely injured was Gideon Hotchkiss, of Windsor, Broome Co., N. Y., the well known inventor. He is now, we hear, out of danger.

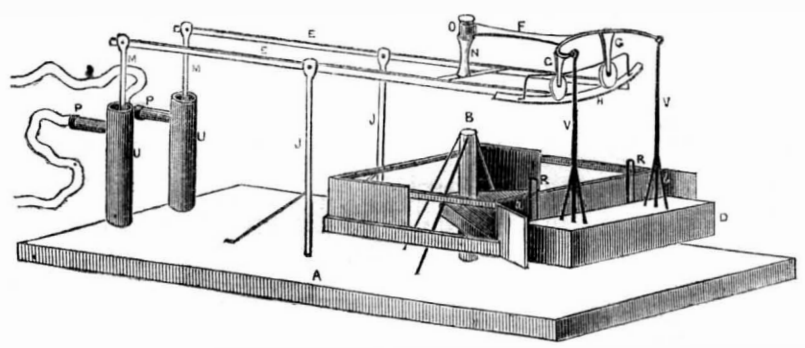
Cumberland Valley Railroad.

The Cumberland Valley Railroad has reduced its fare to 60 cents from Harrisburg to Carlisle, and $1,65 from Chambersburg to Harrisburg.

The Indiana Legislature have passed, by a constitutional majority, in the face of the veto of the Governor, previously exercised, an act authorizing the Terre Haute and Richmond Railroad Company to issue bonds at any rate of interest they may agree upon, and to sell the bonds at any price. Two-thirds of the grading of the road is completed, and the iron and locomotives purchased. Further subscriptions to the stock of $38,391 are required to prepare the road for iron.

The Virginia House of Delegates have, by a vote of nearly two to one, rejected the Bill which had for its object the completion of the Virginia Central Railroad.

MACHINERY FOR OBTAINING POWER BY THE FORCE OF WAVES AND TIDES.---Figure 1.

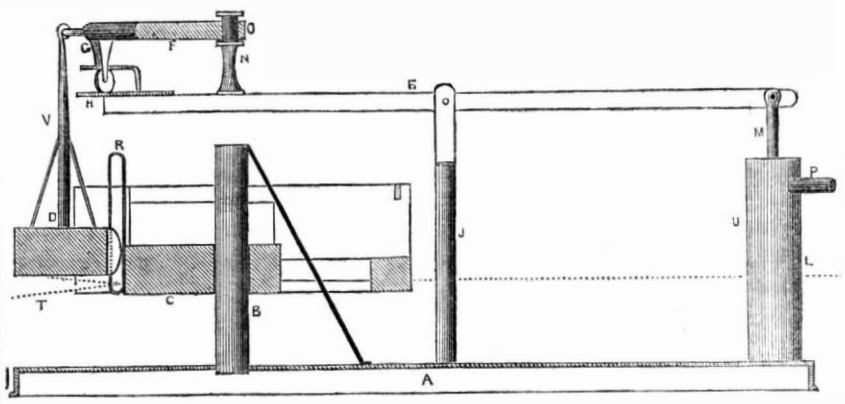


This is an invention of Mr. John T. Denniston, of Lyons, Wayne Co., N. Y., who has taken measures to secure a patent for the same. Figure 1 is a perspective view, and fig. 2 is a longitudinal section. The same letters refer to like parts.

The nature of this invention consists in having a float boat (or any number of such floating vessels) acted upon by waves or tides, so that, by its rising and falling, a motion will be produced to operate machinery for elevating water above its natural level, and transmitting it to any required distance, either for the storing of such water, or to use it for working machinery by a wheel, or otherwise.

A represents the bed plate, or it may represent the bottom of a tidal river or bay of a lake; B is a vertical shaft firmly secured in the bed of the river, and stands above the level of the water at its highest level; C is a floating platform that works smoothly on the said shaft, B. This platform rises and falls with the waves or the tide; it is made with a plate having a wing or leaf, *b*, on each side. These leaves project at any required angle, and serve the purpose of rudders; D is a minor float boat, with guide rollers in its back part, which run in the guides, R R, of the larger float. V V are connecting rods properly braced and attached to the boat, D. E E are working beams, with their working joints or bearings on the top of the posts, J J. N is a vertical fixed spindle, having a collar, O, between which, and round the spindle, an arm, F, works. This arm is made with forked branches, G G, which are attached at their extremities to the connecting rods, V V, of the boat, D; these connecting rods have rollers on their under ends, which travel on the segment plate, H, which plate is connected with the working beams, E E. This plate has a curved guard running over the top of the rollers. U U are pumps; M M are the rods of the same; P P are the spouts and hose leading from the pumps. The suction inlets must always be lower than the water line, L. Supposing the line L to represent the water line, and A the river bed, the floating platform, C, will be partly immersed, with the minor boat, D, seated on the water, or it may be partly immersed. The wings, *b*, of the floating platform will always present the boat, D, in an opposing direction to the flow of the current, &c. As the floating platform is made and secured on the shaft, B, it will be observed that it can swing round and always accommodate itself to assume the right position opposed to the current, &c. The boat, D, therefore, will move to every side with the floating platform, C, and will rise and fall with the rise and fall of the floating element, thus giving the beams, E E, a reciprocating motion, and working the pumps. As the waves come in with the tide, a vertical motion is given to the boat, D, both by floatage and the percussion of the waves, for the waves, as they strike against the front plate, *a*, when the boat, D, is raised (it being more buoyant than the platform), the consequence of the action of the wave is the re-action thrown on the bottom of D, as shown by the dotted lines at T, fig. 2, thus giving to it a higher rising and falling action, and consequently a greater pumping effect. This machinery may be working all night to store up a supply in a dam for working water wheels, &c., during the day.

Figure 2.



More information may be obtained by letter addressed to Mr. Denniston, at Lyons.

Our friend and correspondent, General Chas. T. James is elected United States Senator for six years, from Rhode Island.

The railroads of Massachusetts appear from late reports to be in a healthy and good condition.

The engineers of the Michigan Central Railroad are surveying a route for a railroad from Chicago, Ill., to the State line of Indiana.

Our thanks are due to Hon. J. P. Walker, U. S. Senator, for a copy of his interesting speech on the bill to cede the public lands to the States in which they lie, upon condition that they shall be conveyed to actual settlers.

Iodine as an Element of Animal and Vegetable Substances.

An account has just been published by M. Chatin, of Paris of a series of experiments on animal and vegetable substances, with a view to ascertain the amount of iodine that enters into their composition. All vegetables appear to contain more or less of this element, and it abounds in water-cresses. Wine is much more rich in iodine than water, milk richer in the element than wine, and asses' milk more rich in this respect than that of cows. Eggs contain a large portion of iodine. A hen's egg, weighing an ounce and a half, was found to contain as much iodine as a quart of milk from a cow.

These experiments are important, as indicating the kind of food proper for patients whose diseases are of a nature to be treated by iodine. In cases of glandural affections, this distinction of food might be of great benefit.

A Fine Black Varnish for Coaches and Iron Work.

Take two ounces of bitumen of Palestine, two ounces of rosin, and twelve ounces of umber; melt them separately, and afterwards mix them together over a moderate fire. Then pour upon them, while on the fire, six ounces of clear boiled linseed oil, and keep stirring the whole from time to time; take it off the fire, and, when pretty cool, pour in twelve ounces of the essence of turpentine.

A Varnish to Imitate the Chinese.

Put four ounces of powdered gum-lack, with a piece of camphor about the size of a hazel-nut, into a strong bottle, with a pound of good spirits of wine. Shake the bottle from time to time, and set it over some hot embers to mix for twenty-four hours, if it be in winter; in summer time, you may expose it to the sun. Pass the whole through a fine cloth, and throw away what remains upon it. Let it settle for twenty-four hours, and you will find a clear portion in the upper part of the bottle, which you must separate gently, and put into vial; and the remains will serve for the first layers or coatings.

Receipt for Chapped Hands.

In your paper of last week was a receipt for making camphor balls. This is no doubt a good article, but as some of its component parts are not readily obtained in the country, I send you another, which is more simple, less expensive, and, I think, equally efficacious: I have used it with success for years:—Melt together equal parts of tallow and white-wax; to this add as much olive oil as will give it the consistence of shaving cream, when cold. A few drops of the oil of roses will greatly improve it.

The Wheeling Bridge Case.

Accounts from Washington state that the Supreme court has intimated that a decision in the Wheeling bridge case will not be rendered this term, as the court adjourns about the 10th of March, and the record from which to elicit a comprehensive brief is too voluminous. A copy of the testimony must go into the hands of each of the judges, and as the evidence will constitute a volume of one thousand pages, it is preposterous to hope for an opinion until the term, commencing in December next.

The Canada arrived at Halifax, last Monday, at M., after a stormy passage of 16 days. She brought no tidings of the Atlantic. We have no hope of hearing of her again.

The war in Germany Holstein is terminated. Peace now reigns in Europe. Liberty has no greater foothold in it now than before the last French revolution.

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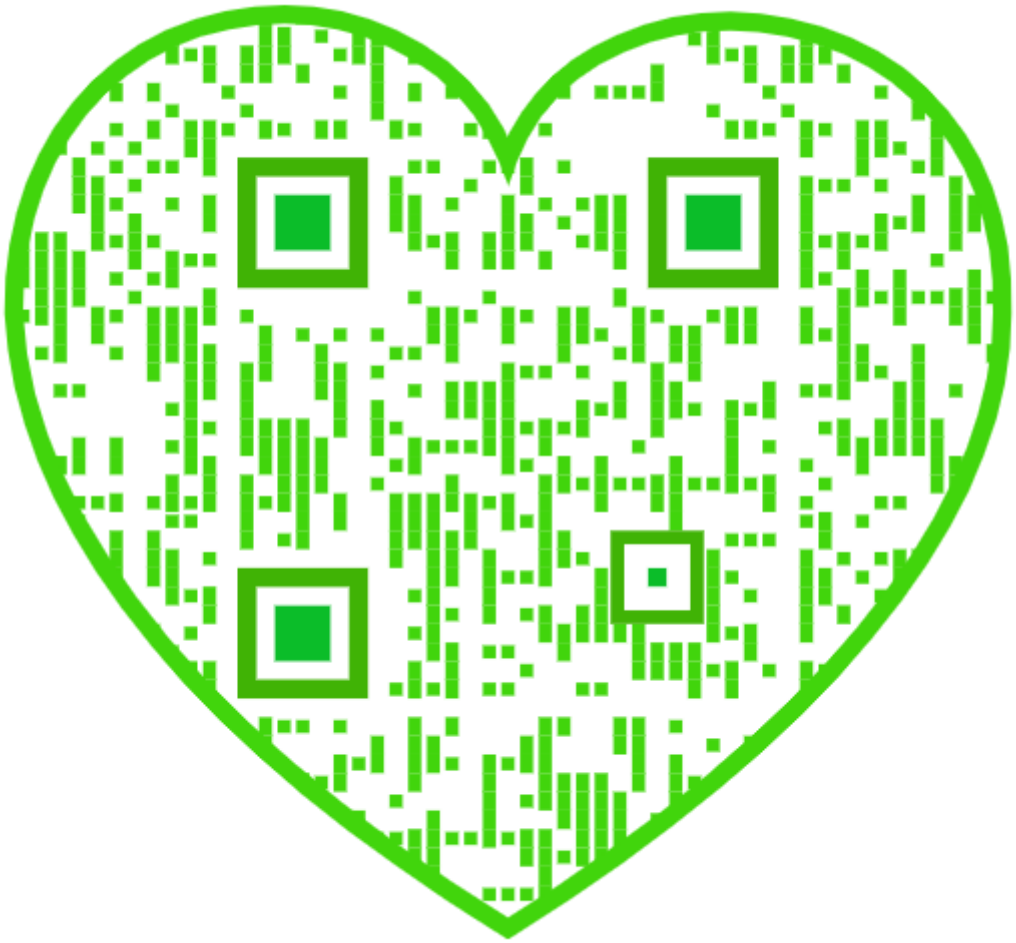


Miscellaneous.

Celestial Phenomena.

The accompanying observations on the planets of our system are from the pen of Thomas Dick—the Christian Philosopher, and were published recently in one of the Dundee papers. They are very interesting.

For some time past the starry heavens unobscured by clouds or mists, have presented a pretty clear field for the astronomical observer; but very few of the planetary orbs have yet come forward for evening observation.

The principal planet to be seen during the evening is the planet Saturn. This planet may be seen due south about twenty minutes past 6 p. m., at an altitude of nearly 37 degrees above the horizon, till after midnight. Its ring, when viewed through a good telescope, now appears much more open than it did last year about this time, and although it lies applicable to the line of vision, and appears like a long ellipse, yet it may be plainly distinguished to be a ring surrounding the body of Saturn, appearing somewhat like a handle on each side of his disc. This is one of the most wonderful and interesting pieces of celestial mechanism to be found within the limits of the solar system. It has been supposed by many eminent astronomers that the lately discovered planet Neptune is also surrounded with a ring; but this point has not been so satisfactorily determined as we could wish, though it seems to be admitted by all who have viewed this planet with high powers, that there is an appearance about Neptune that must either be a ring or some other unknown appendage.

Within these few weeks past intelligence has arrived from America that the astronomers at the Observatory of Cambridge, State of Massachusetts, had discovered a third ring round the planet Saturn—a phenomenon which had been for some time expected. It is announced that this important fact was ascertained on the night of the 15th November last. This ring is said to be interior to the two others; and therefore its distance from the body of Saturn must be comparatively small. It is said to have been observed through the great Equatorial telescope, with powers varying from 150 to 900. The evening on which it was discovered was remarkably fine, perhaps one of the finest since the establishment of the Observatory.

The telescope in this Observatory—which was procured from Munich, Germany, and is 25 feet long and fourteeen and a half inches aperture—is perhaps one of the finest achromators now in existence. The eighth satellite of Saturn was also discovered at this Observatory by Mr. Bond, the superintendent, about two years ago.

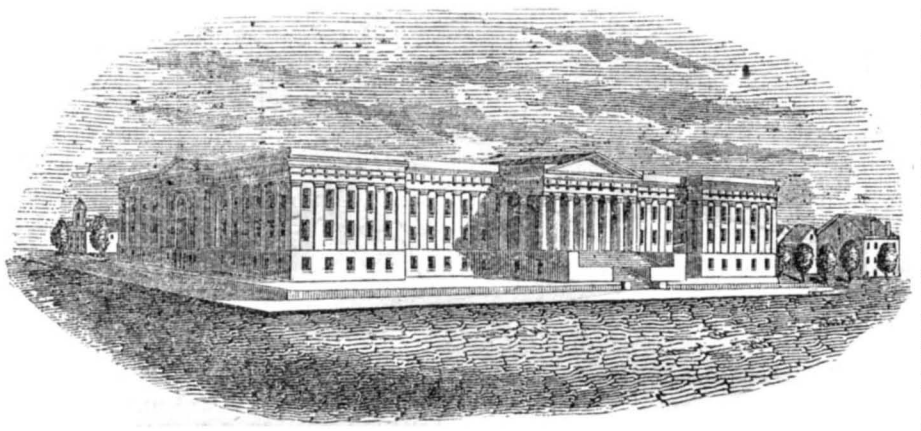
The Planet Jupiter!—This planet is at present a morning star, but, ere long, it will adorn our evening sky. It may be seen shining in splendor about four o'clock in the morning, in the south-eastern part of the sky, near a star of the second magnitude. This is the largest planet of the solar system, which sweeps through the heavens at the rate of twenty-nine thousand miles an hour, and revolves round its axis in the course of nine hours fifty-six minutes. It begins rising on the 1st of February, 1851, in a direction east by south, about eleven o'clock in the evening, and will continue every succeeding evening to rise somewhat earlier. About the beginning of March it will rise about nine p. m., and will be in a position for telescopic observation between ten and eleven o'clock. It will then continue to adorn our evening sky throughout the months of April, June, July, August, and Sept., till near the middle of October—on the 26th of which month it is in conjunction with the sun, soon after which it will be seen only in the morning. Were this planet peopled with inhabitants in the same proportion as England, that is 280 to a square mile, its surface would be sufficient to contain a population of 6,967,520,000,000, or nearly seven billions of inhabitants, which is more than eight thousand seven hundred times the present population of our globe, and nearly fifty times the number of human beings that have existed on the earth since the creation of man.

The Planet Mars.—This planet, on account of its great southern declination, and its distance from the earth, will not be much noticed by common observers for two or three months to come. About the months of October, November, and December it will be more conspicuous, as it approaches to its period of opposition to the sun, when it will appear of a ruddy color, and nearly approaching to the apparent magnitude of Jupiter.

The Planet Venus.—This planet was an evening star from the beginning of March till the 16th of December, but was very seldom seen in the evenings, for four or five months past, on account of its great southern declination. When the sun set, it was just verging on the horizon, and generally set a few minutes after him. It passed the point of its inferior conjunction on the 16th December, and is now seen in the morning in the south-eastern quarter of the heavens a little before sun rise. It may be seen about mid-day with an equitorial telescope, and with this instrument it appears at present like a fine slender crescent, a little to the westward of the sun. It will continue a morning star till the 30th of September, 1851, after which it will be an evening star, but will not be much noticed by common observers, till about two or three months afterwards.

The Planet Mercury.—This planet, which is so seldom seen with the naked eye, will be in good position to be seen about a week before and a week after the 27th of April, when it will be in pretty high north declination.

THE PATENT OFFICE.



Last week we presented the plan views, description, and history of the Patent Office Edifice. We now present a perspective view of the building, and no one can fail to admire the elegance of the design and the harmony of all its parts. This building was originated expressly for the purpose of conducting the business connected with the patents, and no other. No building was ever originated for a nobler or wiser object, and no country in the whole world can boast of such another Institution. We take some pride, and so do all those who have a spark of pure patriotism in their bosoms, in looking upon and talking about such an Institution. It is not sectional in its interests, nor are its objects in any way connected with party politics as a matter of party policy. (This in the abstract not the real track.) It would be very wrong and unjust to divert this building to anyother purpose than was originally intended, and we confidently believe that the attempt to do so will operate politically against the devisers of it. We speak advisedly on this point, and with a perfect knowledge of a very wide spread feeling on the subject. Were we the predominant political party who proposed such a measure, we know that we might expect an opposition decidedly hostile, and effective for party purposes to ensure defeat at some future day. On Wednesday, last week, Senator Walker offered a resolution, calling on the Commissioner of Patents to report whether the present Patent Office building is not sufficient for the business of the office, if the national curiosities be removed from the upper story. After debate the resolution was addressed to the Secretary of the Interior instead of the Commissioner of Patents, and adopted.

This shows how the scheme is working. The Secretary of the Interior, Mr. Stewart, reports in favor of applying the Patent Office to the use of his Department; and here, don't you see, the Senate resolves to call upon him for information on the subject. This is something like appointing a judge to preside and decide in his own case. The resolution was diverted from its original intention—calling upon the Commissioner of Patents. We suppose that some one said the Commissioner held a different position from the old Commissioner—that he was merely like a clerk under the Secretary of the Interior. The late Commissioner, Mr. Burke, while connected with the Union, blamed Mr. Ewbank for surrendering some of the privileges and powers of his office. We are afraid that this is so, and we regret it exceedingly. We sincerely hope that all schemes that have for their object the permanent appropriation of any part or parcel of the Patent Office from its real original intent, will be defeated. We know of no class of men who have benefitted our country so much as the inventors, and some respect should be paid to their feelings. The invention of the cotton gin, the steamboat, the spike machine—card machines, turning machines, the telegraph, and nearly ten thousand other patented inventions, are some evidences of the benefit conferred upon our country by the genius and labors of inventors.

At the present moment there is great excitement in Washington and out of it, among inventors and those interested in patents. We have received a pamphlet of charges against the Commissioner, and a number of papers containing different opinions and statements of different parties. We have also received a copy of the National Intelligencer of last Monday, containing a defence of Mr. Ewbank, by himself; it is an earnest and able defence of his extension of the patent of E. M. Chaffee, for which charges have been brought against him by Mr. H. Day, of this city. We have no party feelings nor prejudices; we have spoken what we honestly believe to be right and just respecting principles and actions.

The Architect of the Patent Office.

The architect of the Patent Office edifice, a description of which we presented last week, is Mr. Wm. P. Elliot, of Washington, D. C., a civil engineer and architect, and now known for his professional abilities. He had been Draughtsman and Chief Clerk in the Patent Office before 1827. He then went to Europe to study architecture, from whence he retnrned in 1834, and it was after that he designed and planned the Patent Office, exhibiting a cultivated taste and great professional acquirements. He also planned the new Treasury Buildings, and has been engineer of several canals and railroads.

Chain Belts.

Can any of our correspondents give us any information about chain belts—their manufacture, different kinds, the power required to drive them, their application and price. To those who may make them we may be enabled to do some good.

We are requested to state that the address of L. D. Grosvenor is South Groton, Mass., instead of Harvard, as given in our List of Patents in No. 17.

We have not heard anything for a few weeks about the great Pacific Railroad. Keep the ball a-rolling.

The Editor of the British Colonist, at Halifax, N. S., will accept our thanks for the favorable notice of the Scientific American which appeared in his interesting journal of the 11th ult.

American Celestial Phenomena.

Astronomical Observations at Harvard.—The following extract from President Spark's annual report to the overseers of the college, will show what has been done there last year, and how it corroborates what the Christian Philosopher says about the Great Telescope:

"The same activity and success have been manifested at the observatory which have heretofore appeared in that establishment. The great refracting telescope continues to justify the sanguine anticipations originally formed of its superior power and admirable construction Regarding this observatory, as acting in cooperation with others in various part of the globe, for the promotion of astronomical science, the director has wisely adopted a method of proceeding by which his observations have been directed to new and unexplored objects, rather than to the task of repeating or veryfying what has already been done. The nebulæ, which appear as dim patches of light through ordinary instruments, are separated by the great refractor into brilliant clusters of stars with their positions and various magnitudes so distinctly defined that they may be easily transferred to a map. The success of the director in delineating the beautiful and remarkable nebula in Orion, is well known to astronomers, and he has been for some time employed upon another cluster scarcely less less remarkable in the constellation of Hercules. The measurement of double stars, and the close inspection of the planets, and of comets, when in positions not to be reached by common instruments, have likewise called into use the powers of the great telescope. Three new stars were discovered, during the past year, in the neighborhood of of the Trapezium, in the nebula of Orion; and also a variable star, which appears and disappears at intervals of a few weeks; but the observations have not, as yet, been sufficiently numerous to furnish data for ascertaining accurately its period. The great telescope has also revealed to the searching eye of the observer, a third and interior ring of Saturn, which had escaped the power of all other instruments. The indefatigable and skilful labors of the assistant observer, Mr. George P. Bond, enabled him to detect two new comets, one in May, and the other in August, before either of them had been seen in Europe. Special attention has been given to the accurate adjustment of time-keepers, by observing the transits of stars over the meridian, aided by the long experience of the director in this branch of mechanical science. By a specific arrangement, made for that purpose, the motion of every railroad car in the commonwealth is regulated by the time at the Observatory. The vast benefit thus conferred on the public will be at once recognized, when it is considered how much human life often depends on the accuracy and uniformity of time, with which all the movements on the railroads are directed. An important accessory to the Observatory is an apparatus for applying the electro-magnetic communications to astronomical purposes. Telegraphic wires extending from the Observatory and connecting with the great lines of telegraphs, convey the result of an observation instantaneously to an observer at a remote place, thus affording the means of an immediate and precise comparison of time. By this process the differences of longitude are ascertained with the greatest exactness, an attainment of the utmost importance.

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Explosions of Steam Boilers---Their Causes and Remedies.

This subject has been so often discussed, and the public is so well acquainted with it in all its details, that it seems almost like repetition to say any thing more about it. Were there no causes for discussing it now, we would not say a single word pro or con, but when we hear of one or more steam-boilers exploding every week, and many of our fellow beings and friends suddenly deprived of life by such sad catastrophes, we cannot nor dare not be silent,—if we say nothing more than bid farewell to the departed, and demand justice on the guilty living.

In no country in the world is there such a recklessness of life, on steamboats, as there is in ours. During the past year sixty-seven steamboats were lost on our Western waters, the majority of these losses being caused by explosions. Four hundred and sixty-seven lives were lost, and a great number severely injured. On our northern lakes, in the course of nine years, 7 explosions of steamboilers have taken place, and 11 steamboats have been consumed by fire. About five hundred lives were lost by those accidents. The chief quarter for the explosions of steamboat boilers is the Mississippi and its tributaries. On the 13th of last September, the Anglo Norman blew up, carrying sorrow to many hearts in this city; and two days after that, the steamer Knoxville exploded at the same place

A writer in the "N. Y. Herald" believes that the explosion of the Anglo Norman was caused by the steam becoming *stame*. This is a new property of steam, discovered and thus defined by Mr. Frost, of Brooklyn. who, no doubt, is the author of the article. *Stame* is steam brought into contact with a hotter surface than 212°, out of contact with the water in the boiler.

He thus speaks: "the Anglo Norman was furnished with a low pressure condensing engine, constructed at one of the first foundries, and furnished with all known inventions, notwithstanding which, the boiler, weighing many tons, exploded, and disappeared from the boat.

The low pressure boiler exploded, from some unknown and unexpected cause to the capable and practical engineers aboard, causing their horrible deaths, and also of ten others, and the more or less concentrated infliction of excruciating torture on eighty-five others, to the endless sorrow of their numerous relatives, and still leaving all other persons in dread of like inflictions when exposed to similar circumstances, seeing that neither low pressure engines, or the wisest engineers, are exempt from, or possess sufficient knowledge to be secure from equal calamities. We have experimentally found the addition of comparitively trival quantities of heat to steam apart from water, so rapidly and greatly increases the volume of steam by a wonderful, peculiar, and hitherto undiscovered law of nature, that little more than one-tenth the heat requisite for the formation of steam, when added to steam apart from water, doubles that volume of steam, and that about two-tenths, or one-fifth the heat required for the formation of steam, when added to steam apart from water, increases the volume of that steam eight fold, so that it is thus shown the extra caloric applied to steam, apart from water, is more than thirty times as effective for the production of noxious or destructive force, as was the same quantity of heat when applied for the production of steam; therefore, it must be seen, proportionally, the further application of but an inconsiderable quantity of heat to steam, would constitute an infinite expansive force.

We have thus seen the nature of the unknown and unexpected danger contingent on the use of one of the best constructed low pressure boilers and engines, superintended by men of superior information, but ignorant of these newly discovered properties of heat kindly provided by providence for the greater advantage of mankind, under the penalty of death and torture for their misuse or ignorance."

This much is given to prove the cause of the Anglo Norman's explosion, namely, *stame*. A writer in the Herald answers this and says, "if the writer" (alluding to Mr. Frost) "supposes he has discovered a new agent, called "stame," yet I am not convinced that he is right. It is perfectly well known to all who have used the steam engine, that both high and low pressure boilers are constructed so that the smoke flue or fire passage, frequently passes through the steam chamber.

If his argument was correct, the heat of this fire flue must generate the "stame" in all cases where such boilers are used, and immediate explosion of course takes place, as soon as any steam is formed in the boiler.

I am induced to believe that all boiler explosions are occasioned by gas, generated by water coming in contact with red hot iron; and that this gas and its consequences are only occasioned by a low stage of water within the boiler, causing the upper surface of the fireplace to be exposed naked to the action of the fire, which surface is almost instantly heated red hot, and the first jet of water within the boiler covers this surface and the result deprives the engineer of the power of confessing the cause. The explosion in Hague street, last winter, and the numerous steamboat explosions of late, may all, in my opinion, be attributed to this cause.

That the gas called "stame" may be used as a motive power, all engineers will doubt who have observed their engine to stop action suddenly, under what was thought to be a high pressure of steam, but found to be gas (generated in some unaccountable manner) which will not propel an engine.

I do not believe that any boiler has ever yet been exploded by steam. Wrought plate iron is almost invariably used in construoting steam boilers. The pressure of steam is gradual, and its first effort to escape is made at some weak point, as an air bubble in one of the plates."

These opinions are worth something, because no man ignorant of the steam engine could write thus about explosions. But let us give some more opinions. They are valuable as they exhibit the salient points of those minds who have given the subject attention. A writer in the Mobile Tribune attributes all explosions to *high fire lines* on the boiler and *low water lines* within.

He says, "the, and the only remedy against such accidents, is to lower the fire lines, by bringing the side wall against the boilers at, or below their centres. This will always prevent explosions, except in cases of total negligence on the part of the engineers, by which boilers suffer materially for want of water. To assert that pure steam has ever exploded a good boiler, is to assert a palpable impossibility.

Any boiler made of merchantable iron, of three-eighths of an inch thick (the usual thickness) will bear, with safety, 6,000 pounds to every inch in its length, on any one line drawn from end to end. In this estimate 50 per cent is deducted for loss of metal by punching process, instead of three-sevenths, which is the actual loss.

All this noise then, about explosions by steam, is a "fal-de-ral," and will not bear the light radiating from philosophy and mathematics. No: steam has not done this mischief, nor ever will; but that article called hydrogen gas, which is a full blooded-cousin to gunpowder, has done all the mischief. One pound of hydrogen gas will do more, in the way of explosions, in one day, than two hundred pounds of pure steam will accomplish in one hundred years.

After hydrogen gas is generated, by firing on steam, an explosion is then produced by the gas coming in contact with heated iron which causes ignition; and the effects are similar to those caused by igniting gunpowder.

If every man on earth were to assert, or even swear positively, that the water lines were above those of the fire lines at the time of the explosion, it couid have no weight in bringing such a conclusion to my mind."

So much for what this gentleman says, and he claims to be acquainted with steam. Let us now refer to the opinion of a man of genius, practical skill, experience and fame. We refer to a report of Mr. Fairbairn, the eminent engineer of the authorities of Halifax, Eng., on the explosion of a boiler attached to a woolen factory in that place. He says, "the only remedies he can suggest are that boilers should not be allowed to be placed under buildings where people are employed, and that those now in the position be as speedily removed as possible.

That boilers of the wagon shape should not be worked at a pressure exceeding 10lb. on the square inch.

That after a certain date every new boiler should be proved up to not more than one-third its bursting pressure, and to three times its intended working pressure.

Lastly, that every boiler should be fitted with two safety valves; one to be self-acting, and beyond the reach of the engineer or any other person but one, to whom the duty of examination should be expressly entrusted."

In reference to the opinion of the person who alludes to stame being the cause of the explosion of the Anglo Norman, we would state that Mr. A. C. Jones, in a letter from New Orleans, to the "Franklin Journal," two days after the explosion, states that her boiler was of the wagon form, 30 feet long, and 16 feet wide. In the interior there were four plain arches (without any water bridges) extending to the back end, with eight return flues above them. From evidence elicited, it appears that no more than 24 lbs. of steam were carried when the explosion took place, and Mr. Jones states that the boiler could stand 54 pounds. We have here one cause of explosions developed, namely, our engineers place too much confidence in the strength of their boilers. Here is Mr. Fairbairn, who has tried, perhaps, more experiments to test the strength of iron than any other living man, says that 10 lbs. is as much as a wagon-shaped boiler should be allowed to carry. The reason why there are less explosions in England, is owing to the low pressure of the steam used. Mr. Jones believes that the explosion was caused by "the middle arches giving way, and the lower part of the boiler opening out sideways." The engineer was a careful man, and there was plenty of water in the boiler. Neither *stame* nor water in a *spheroidal* state was the cause of the explosion. It was a bad boiler. We believe, however, that over-pressure, is not the only cause of boiler explosions. Some boilers have exploded when no over-pressure could account for the accident. But hydrogen gas never will cause an explosion, as set forth by the correspondent of the Mobile Tribune, for this gas is not explosive, and will not explode until it is mixed with a certain amount of oxygen or the atmosphere. By very great heat water may be resolved into its elementary gases in a boiler, and an electric spark may do the rest. Electricity is generated in the boiler. We do not believe, however, that many accidents take place from such causes. The bad construction of boilers, and over-pressure are the main causes. It may be that there is something in the sediment of the waters of the Mississippi, which, in the steam boiler, amounts to little else than explosive powder—the chlorate of potass. This subject should engage the attention of some chemists in our western cities.

(For the Scientific American.)

Linen---The New Discovery.

It is surprising to many that linen manufactures have been so long neglected in this country. Flax grows well here, and the Americans are certainly not far behind other nations in manufacturing skill. The truth is the recent improvements in the spinning of flax by machinery happened to be made in another place, and where flax was produced in the condition most favorable to the method of manufacture there; while our farmers would not go to the trouble of water-rotting flax for the prices which they might obtain by shipping it abroad, in the absence of all markets for it at home.

In 1845 I discovered processes and invented machinery by which it is demonstrable that fine linen can be produced from hemp or flax cheaper than cotton goods of equal fineness; and in that year I visited England, Scotland, and Ireland, mainly to ascertain whether my invention was known there or not, and where I communicated a knowledge of it to one person only, a Liverpool merchant. It seems that others have made, or seem to have made, a similar discovery in Europe, and English newspapers express joy at the prospect of English independence of American cotton growers, from their ability, by these new improvements, to produce linen at so low a rate as to run cotton out of the market. It is not very surprising that England is elated at this prospect, notwithstanding her free trade notions.

But the tables will soon be turned. We can produce linen so much cheaper than it can be produced in the United Kingdom, or European countries generally—that in less than twenty years, they must be as dependent upon this country of cheap land for manufactured linens as they now are for raw cotton! The reasons are obvious. The unsteeped or unrotted hemp or flax is preferable, requiring much less labor in its production than the other. Flax is now grown for the seed only in this country, and to so great an extent, that lint enough is thrown away to supply the whole country with linens. If we will pay the farmer anything for the flax straw he now casts out as worthless, he will be doing just that much better than he now does. It can be purchased at from five to seven dollars a ton, making the lint cost not exceeding thirty dollars a ton, or a cent and a half per lb. This makes the product of an acre amount to only about five or ten dollars, while it is proposed to pay, in Ireland, more than five times that amount for the product of an acre of flax in the same condition (unrotted), and Irish lands cannot be cultivated for a much less sum.

By using flax or hemp unrotted, it must be manufactured in the neighborhood where it is grown. It will not do to think of transporting from 5 to 6 tons of flax straw to Ireland to get one ton of flax lint, nor can we expect our farmers to erect factories for the purpose of half manufacturing their flax, to be completed by foreigners. They will confine their business to agriculture only, and, after taking off the flax seed, haul the flax straw to the neighboring factory, to be manufactured into linen, as they now haul their wheat to a neighboring mill to be manufactured into flour.

If European countries can grow flax cheaper than we can, they can manufacture linens cheaper, if not, not.

By the new process I may say that machinery does more, and labor less in proportion than by the old processes of manufacturing linens, so far giving our new country an advantage more than sufficient to counterbalance the difference in the price of labor in the two continents.

The new process will not probably affect the price of linens for some time to come, and, for many years, the manufacture must be extremely profitable. Machinery can now be purchased, by which a guaranty is made that linen yarns, as fine as 100 leas, can be produced as cheap as cotton, at present prices, and so long as linens remain as high as now, or anything like it, very large profits will be made. It will require a considerable number of linen factories to affect the prices of linens materially, and no doubt the first factories will make the most money. Immense fortunes were made by the first manufactures of cotton, on Arkwright's plan of spinning by rollers, and similar fortunes may be expected by the pioneers in the new linen movement.

O. S. Leavitt.

Maysville, Ky., Jan., 23, 1351.

An American Steamer on Lake Nicaragua.

The American steamer Director succeeded in passing the San Juan river rapids on Jan. 1st, and immediately ran up the river, and launched upon the noble Lake of Nicaragua. This is the first steam vessel which has ever appeared on the great lake. The news of her arrival at San Carlos, the southern port on the lake, spread throughout the neighboring country like wild-fire, and hundreds of the natives, many of whom had never before seen a steam vessel, came running into the town. Lake Nicaragua is 95 miles long, by 20 wide, studded with small but luxuriant islands. It is one of the most beautiful inland sheets of water upon the face of the globe.

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New Inventions.

Improvements in Machinery for Making Cotton Batting.

Mr. Alonzo Arnold, of Norwalk, Conn., has made a most excellent improvement in machinery for making webs of cotton batting, for which he has taken measures to secure a patent, and which will no doubt revolutionize the manufacture of this useful article. Cotton wadding is made by having one continuous webb, called warp, of cotton passing from the cards, and section webs called weft, laid on the top, all along, breadth after breadth. The wefting is the new feature. By the old process, the cross or wefts, were carried along at right angles by hooks and dropped regularly on the warp. This was a troublesome plan, and Mr. Arnold has ingenuously superseded it, by a very simple and scientific one. He employs an endless apron and carries his section cross bats along on it. But the question will be asked, how can the endless apron carry a loose bat face downward and drop it, as he must do in an instant, at the right moment? This he does by having a thin hollow box between the two sides of the revolving apron; and by having the under face of this box perforated and in connection with an exhaust apparatus, the weft adheres to the apron by this means, and whenever the lap is to be dropped, a cam cuts off the exhaust and opens another valve, which drops the weft on the warp in one instant by the re-action of the air.

This improvement is a very excellent one, truly and cannot fail to commend itself universally. The machinery is very simple in its operations and not liable to get out of order, we believe, if it is well constructed and carefully attended to.

New Way to Tin Iron.

Cleanse the surface of the iron well, by scouring with weak sulphuric acid, to remove oxide, then immerse the iron in a bath composed by digesting in 17½ pints of soft water, 10½ ounces of bitartrate of potash or soda (tartric acid, or acidulated tartric of potash, or soda cream of tartar), and then adding an aqueous solution of three quarters of an ounce of protochloride, or other soluble salt of tin. In the same proportions any other quantity may be made up. Another way to tin tacks &c., is as follows. Make up a bath composed of water 22 lbs., ammoniacal alum 17½ ozs., and protochloride of tin, or other soluble salt of the same base, 1 oz. heated to about the boiling point, dip the tacks in this for a short time when they will be well tinned. The alum employed will last for a considerable time, and when the bath is weakened by the precipitation of the tin therein contained, the addition of a small quantity of the above salts or other salts of tin will restore its action.

Another Perpetual Motion.

The Bordeaux (French) papers have been much occupied of late, with the discussion of a new discovery which has recently been made in that city, and of which the *Guienne* gives the following account:

"The new discovery which has just been made at Bordeaux, occupies, at present, the minds of all. By means of this ingenious invention, the pressure of a man's weight can put in motion a weight of 200 kilogrammes, (about 425 lbs.) placed at the extremity of a shaft about 40 inches in length. The swiftness is double that of the rotations of the steam engine, under comparative circumstances; but this swiftness may be increased at will, for it depends upon the pressure imparted; so also, with the force, which augments in proportion to the length of the shaft and the weight placed at its extremity.

The machine in question has been inspected by a large number of scientific persons, all of whom have been surprised at the reality of this discovery. Steam, in consequence of this discovery, will be almost entirely dethroned, as a motive power. The weight of the steam-engine, with its accessories, its fuel, and the space which they occupy in ships, will be replaced by a weight equal to about the one-tenth of that of a single boiler, and occupying a space of 13 feet in length by six and a half in width, at the most, for machines of great power.

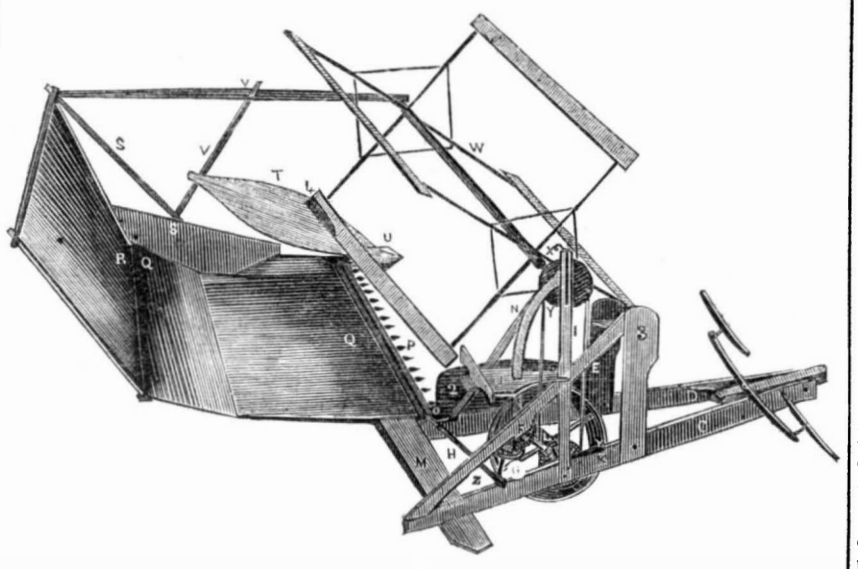
[This will no doubt throw all the electric lights into the shade. The Bordeaux papers are very fortunate in having such geniuses among them, as the inventor of the above. How *scientific* those gentlemen must be who have examined this machine and pronounced the days of steam numbered.

Anthracite Glass.

Mr. E. V. White, of Honesdale, Wayne County, in this State, has succeeded in constructing a furnace by which window glass is manufactured with no other fuel than anthracite coal. The result is entirely satisfactory. Coal has never heretofore been used in any part of the world in the manufacture of glass. —[Exchange.

[This is a good joke. How do they make glass in those countries where nothing but coal is used.

McCORMICK'S REAPER.

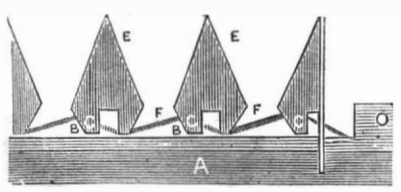


The accompanying engraving is a perspective view of the machine for reaping and harvesting grain, known by the name of McCormick's Reaper, which is derived from that of the inventor and patentee, Mr. C. H. McCormick, formerly of Virginia, but now of Chicago, Ill. The patent which Mr. McCormick secured in 1847, was contested at the last October Term of the Northern District of New York, and an injunction granted to restrain the defendants, Messrs. Seymour & Morgan of Brockport, N. Y., from making, using, or selling the same.

Figure 1 is a perspective view of the Reaper. The driver has a seat between the uprights, 3. C is the outside bearer, D the inside one. The whiffletrees are attached to the forward ends of the bearers. Y is the band; I is the reel post; K is the shipper for putting the machine in or out of gear; L is the master cog wheel and pinion; F is the wheel brace, bevel wheel, and crank pinion; G is the crank and fly-wheel; H is the driver or connecting rod; Z is the connection of but hand and finger beam; M is the finger beam; J is the raker's seat; N is the brace to the frame; 2 is the wheel board for turning the grain into the machine; O is the connection between the driver and sickle; P is the fingers and sickle —being the cutting apparatus; Q is the platform for receiving and holding the wheat; R is the canvas; S S are the side board and brace; V V are the reel bearer and brace; T is the separator board; U is the dividing iron; W is the reel; 4 is the blocks on the reel board; X Y the reel pulley.

The accompanying engraving, fig. 2, represents, on an enlarged scale, an important im-

Fig. 2.

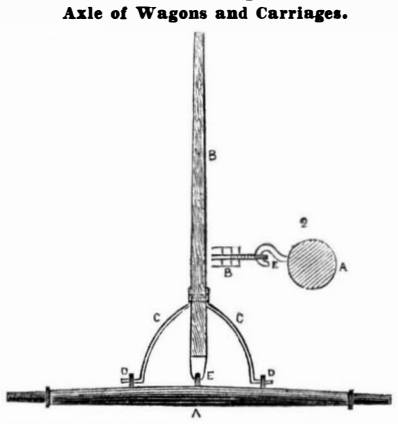


provement made by Mr. McCormiek, since last harvest. The improvement relates to the cutting parts; it consists of a combination of the shoulder, C, or back angle of the "fingers," E (as patented and used in the machine) with a slightly indented and zig-zag edged sickle; by which arrangement, as seen by the figure at E F, the angle in the sickle edge is rendered so obtuse that it will, along with the finger for holding the grain to the sickle, cut the grain, &c., in the best manner, at the sloping angle of least resistance. The objections to the zig-zag edge, as used by Hussey and others, are entirely obviated in this, and the benefits of the fingers are retained; without the angle in the finger for holding the grain to the sickle, it has been necessary to use a blade for cutting, set at such an acute angle, that it required a high velocity to make it cut. This involved a great loss of power, and was the cause of rendering the parts more liable to get out of order, as the grain was rather cut by the abrupt stroke of the blade, than with a fine natural cutting action.

By a thorough course of experimenting in cutting grass that was lying in a bad condition, Mr. McCormick believes, and says, that he has now secured the best possible arrangement and combination for cutting both grain and grass; and at the same time the most simple and durable one. He intends to have 1500 of them ready manufactured for the next harvest. The cost of these machines is from $75 to $125, and one will cut from 12 to 20 acres of grain per day. One machine will be exhibited at the World's Fair. They cut the grain of an even height, and the fields look well that have fallen beneath its operations. Either two or four horses may be employed.

More information may be obtained by letter addressed to Mr. McCormick, at Chicago, Illinois.

Improvement in Attaching the Pole to the Axle of Wagons and Carriages.



This improvement is the invention of Mr. Thomas Ring, of Worthington Mass., who has taken measures to secure a patent for the same. The improvement consists in extending the pole back and connecting it to the axle as well as the hounds, whereby a great strain is taken off the hounds or eliptic braces.

The accompanying engraving is a plan view. A is the axle; B is the pole of the carriage; C C are the hounds; D D are eyes in the axle through which hooks in the hounds are inserted; E is an eye in the end of the pole, B, into which a hook on the axle, A, catches. The small transverse section, fig. 2, shows the hook, axle, and carriage pole, B,—the same letters in one referring to similar parts in the other figure. The engraving shows the improvement so plainly, that it is needless to say but little more about it. The common way of attaching the pole to the carriage, is just to have the end of it come between the hounds, C C, and then coupling them together by a bolt passing through. By extending the pole to the axle, the strain is in a great measure equalized between the axle and the hounds. This improvement is very suitable to small carriages, such as those now made so extensively for children. The principle of the improvement is in extending the pole and combining it with the axle, as represented, or in any similar manner.

More information may be obtained by letter addressed to Mr. Ring.

New Electro-Chemical Telegraph.

Recent and wonderful improvements in the transmission of messages by the electric telegraph have recently been exhibited in France. The instrument is the invention of Mr. Bain, and called an electro-chemical telegraph, and conveys its message in the very handwriting of the persons who send them! It claims to have great advantages over the electro-magnetic telegraphs in general use. While the latter transmit dispatches at an average rate of eight words per minute for each conducting wire, this new invention can transmit from 250 to 400 words per minute. A committee of the French Legislative Assembly, at the head of which was the celebrated astronomer, Le Verrier, was appointed to investigate the merits of this invention. They caused the experiments to be repeated in their presence. A message consisting of several thousand words was transmitted to Lille and back, along a single wire (the wire being united at Lille so as to carry back the message), at the rate of about 1,500 letters, or nearly 400 telegraphic words per minute. The committee reported favorably of the project, and the government ordered a set of apparatus to be constructed, to be placed in the first instance on the line between Paris and Calais. This line was completed in the early part of the last month, and their performance was witnessed by the correspondent of a London journal, from whose account of the discovery we gather our information. His own dispatch, which would occupy about a column of our paper, was transmitted and writen by the apparatus in his presence at the rate of 1,200 letters per minute. The characters were perfectly distinct, and the dispatch was read from them also in his presence.

Improvement in Endless R. R. Horse Power.

Mr. Cyrus Avery, of Tunkhannock, Wyoming Co., Pa., has invented a very excellent improvement in railroad horse power, for which he has taken measures to secure a patent. He places friction rollers on the ends of the stationary rails, at the tangents, so that the whole of the endless railroad wheels press with their peripheries on the periphery ef these end rollers, at the point where the wheels change their motion, and the result is a change of motion without any sudden concussion, as the motion of the road wheels is communicated to fixed rollers, and all the friction is thrown upon their axes instead of the peripheries of the railroad wheels.

Manufacturing in Nashville.

A company, named the Nashville Manufacturing Co., has just been organized in that city, with a large cash capital, for the purpose of engaging on a large scale in building all kinds of engines, locomotives, and other machinery, in a style equal to any in our country. It is the intention of the company to put its works in operation at an early date, and which is now delayed only for the want of a thoroughly skillful man to put at its head—to superintend the mechanical department, so as to furnish machinery, &c., for the Chattanooga Railroad, which is now nearly completed, and which is intended to connect Nashville with Charleston, Savannah, &c. It will also connect with other southern roads now in progress, and several others which have been projected.

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Scientific American

NEW YORK, FEBRUARY 8, 1851.

Our Ocean Steamships.

We know of no question which engages more attention, at the present moment, than the one we have now selected to make a few remarks upon. And it is no wonder that it excites so much attention, for the interests, the skill, and the honor of America, are at stake; and every morning, from lip to lip, and ear to ear, is heard the watchword and reply, "is there any news of the Atlantic ?"

It is now thirteen years since regular steam navigation was established between Britain and America. For the successful establishment of this great blessing,—and who can deny that it is one—we are indebted to foreigners. But, although this is true—and we are always happy to give honor to whom honor is due—it was with no wish to injure the business of those who laid the foundation of Atlantic Steam Navigation, that American companies engaged in the undertaking of establishing two lines of Atlantic steamships, —no, it was from a firm conviction of the imperative requirement of raising up a marine steam navy. The United States is the second mercantile nation of the world, and when we found that some other nations, with not a one-hundredth the interests at stake that we had, possessed respecatble steam fleets, it was surely no more than the dictates of sound national policy that urged us to commence ocean steamers—yea, we may say, it was urgent national necessity ; for marine navigation requires great experience, involves great expense, and these conditions cannot well be met in our country, without combining like the Royal Mail Line, the national with the mercantile interests—the mail with the cotton bale. Three years ago America sent out her first Atlantic steamship, the Washington, which was succeeded at considerable intervals by the Hermann, and the United States. These vessels formed a line between New York, England, and the Free City of Bremen, on the continent of Europe. In 1850 a new line of American steamships was established to run between New York and Liverpool, to carry the national mail and share the advantages which had been exclusively enjoyed by our enterprising rivals for eleven years. It was quite natural that the heart's desire of our people should go out in good wishes for the prosperity of our ocean steamships, and the natural questions are, "have they been successful ? Do they equal those of Great Britain ?" We do not believe they have, and will give a few reasons why they have not.

Before the last war with Britain broke out, Prof. Gregory, of Edinburgh, in company with a few friends said, in answer to a boast about the superiority of the British navy, after it had swept the seas of every French fleet, "the Americans have built some long frigates lately, if we have a war with them, they will give an account of themselvse." During the war, they did give an account of themselves. In the construction of ships and sailing vessels, America has for forty years stood at the head of all other nations, and has, in competition, successfully snatched the trade out of the hands of our naval fatherlanders. A great drawback on improvemts in the construction of British ships, was bad tonnage laws. In the construction of steamships, the British have all along stood unrivalled. We had no ocean steamships until within a few years, the British had no river steamboats—all their steamboats were built to stand the ocean tempests, because they had all to go out to sea, owing to the shortness of the rivers of England. When our first line of ocean steamships was established, owing to a well merited confidence in our sailing vessels, the general expressed opinion was, that we would beat our rivals. We failed to do so, and many among us had to eat our own words. We have a wrong notion of Uncle John Bull's go-a-head propensities—his desire to go through creation is just as strong as that of any of his American descendants. His locomotive goes faster than any other in the world ; and if we have been in advance in the building of sailing vessels, the greatest rivalry and attention has been paid in Great Britain, for twenty years, to the building of fast sailing steamships.

When the Collins' American Mail Line was established, last year, great expectations were formed, and superior results anticipated. We saw the Atlantic depart on her first voyage, and could not help greeting her departure with cheers, and wishing her "God speed." Other ships of the same line, succeeded her, and made very succesful passages, in point of time, during the past summer and autumn, but during the past stormy months of this winter, they have not done so well. It is too common a practice for our people and our editors generally are very much to blame, in cheering rather too loud, at any partial success, and are too ready to turn round and scold at any partial want of succcss. This is not right; sympathy should be extended in many cases, instead of blame. It would indeed have been a most wonderful thing to us, something almost miraculous, if we could have so soon rivalled the Cunard steamships in all things, but not in some things. And to throw some light on this subject let us revert to some facts in connexion with them which but few of our people seem to be aware of.

All the Cunard steamships have been built and completed from stem to stern on the river Clyde, in Scotland. The principal stockholders are Glasgow merchants. The builders of the hulls of them, are Messrs. Steel & Caird, of Greenock, (with the exception of the Europa) and the engineer, Mr. Robert Napier, of Glasgow. The river Clyde has always been famous for building swift sailing vessels, and we have been informed that Henry Eckford, so well known as a most scientific ship builder in this city, served his apprenticeship in the very yard where these ships have been built. These nautical architects, have been acquainted with the building of steamships from the very origin of the art, and the builder of the Europa—the finest hull of them all—was John Wood, the gentleman who built the hull of Henry Bell's first steamboat—the first successful one in Europe. Here, then, practical experience—an accumulation of facts respecting the faults and merits of different forms of steam vessels have been in the possession of these men, and is it wonderful that they should be able to challenge superiority ?

Robert Napier has been engaged as a builder of marine engines for thirty years, and he has built more marine engines in one year than all our companies put together have built in all their lives. He is a practical engineer, too, as well as a scientific one. He is a self-made man, and possesses inventive faculties of a high order, and has an abundance of wealth at command, and has far better means, such as tools, &c., for constructing marine engines, than can possibly be expected of any of our engineering shops. The very successful passage of the Pacific, and some of the Atlantic's, led some of the London newspaper critics —especially the "Nautical Standard," to run down the Clyde-built steamers; and a correspondent of the London Mechanics' Magazine, in an article which was copied in the Franklin Journal of last month, takes the ground that Collin's American steamers are superior to the Cunard line, because they have tubular boilers. The way whereby the British are to attain the mastery, according to his dictum, is to adopt oscillating engines in preference to the side lever kind. A correspondent of the "N. Y. Herald," alluding to the Baltic and Arctic running short of coal on their recent voyages, throws all the blame on the inexpeperience of the firemen. He signs himself "Engineer," and he says that those connected with the Cunard vessel, have said "*Give us your vessels and we will beat you one day*;" and they might have added, "*and save ten tons of coal.*" Another letter in the Tribune of last Tuesday, makes out the Asia to be superior to the Baltic in speed, according to her power, all owing to having a larger paddle surface according to her tonnage. Here are contradictory opinions—not one of which is worthy of confidence, because there is an absence of facts for premises. Tubular boilers for steamships were tried and laid aside by Robert Napier long ago. There is much truth about inexperienced firemen, but who are their bosses? the engineers. Oscilating engines, in opposition to the London author, have been tried and decided against, and when the proper size of paddle surface for the tonnage of a vessel is demonstrated then we shall have a fact to base a theory upon. At the present moment, we want, more than ever, the influence, the sympathy, the support and encouragement of all our people for our ocean marine. Let this be liberal, reasonable, and prompt, and experience will do all the rest for our success and future progress.

Rationale of the Composition of Water.

When we look into the constitution of bodies, we find them made up of particles—some all of one kind, others of many kinds. Taking water to illustrate this point, its elements can be separated by the voltaic battery. By electrolysis we are able to divide the water into two gaseous unequal parts. One of the gases is highly inflammable, very light, and is named hydrogen; the other is heavier, will not burn itself, but will cause other bodies to burn with a great heat, and to emit, generally, a bright flame: this gas is called oxygen. Oxygen and hydrogen, then, are the two constitutional elements of water. By means of a galvanic battery, these elements of water can be separated, and the proportion of each estimated. In every case these proportions are definite, and consist of 1 volume of oxygen and 2 of hydrogen, (volume means bulk, a very different thing from weight). Both of these gases have a gravitating power. Oxygen is allowed to be the most abundant of all elements. It has neither color, taste, nor smell, and it combines with all elements in many proportions : 100 cubic inches of oxygen weigh 34-6094 grains. Oxygen may be produced by heating the scales of iron which are found in blacksmiths' shops, in a gun barrel.

Hydrogen may be produced in various ways —by taking some tin and placing it in a bottle containing sulphuric acid and water, the result will be the decomposition of water, and the hydrogen will be given off. The specific gravity of the hydrogen—100 cubic inches—is only 2-1318 grains. Hydrogen is the lightest of all gases, and is, therefore, the best for inflating balloons, but it is expensive, hence light coal gas is in general used as a cheap substitute.

Hydrogen and oxygen combine to form water by a power named chemical affinity. This power is quite different from the law of gravity; it means that two separate elementary bodies unite together by a law, whereby each parts with some of its properties, and produce a new mass, having different qualities from the two bodies, separate. Soap is made of oil and an alkali. The compound is very different in quality from the two bodies when separate.

In every case, when hydrogen and oxygen are placed in a vessel, in the respective volumes, mentioned above, they can be instantly changed from a gaseous state, into water, by flame, the electric spark, or a niece of platina. Water can thus be resolved into its original elements, and its original elements made to combine and form water. Every chemist can do this, just like pouring one cup of water into another, and then pouring it back again. No man has yet been able to resolve pure hydrogen into water—it cannot be done. The assertion that has been put before the public, that water could all be resolved into hydrogen, should, therefore, not be received without the demonstrative proof of resolving the hydrogen into water. Oxygen and hydrogen, when they unite to form water, create an explosion, when the electric spark is passed through them. There must be a sudden great expansion, and a sudden great contraction—for this reason. The mere contraction or condensation of the gases to form water, would only cause an outward pressure of near 15 lbs. on the square inch, (the real pressure of the atmosphere on a vacuum vessel), but the effect produced by the explosion of these gases, when they unite to form water, is far greater than that which can be due to the pressure of 15 lbs. on the square inch. Those persons who would try the effect of resolving water into its elements, and resolving the same into water, must be very cautious about what they are doing. To show how much water is expanded when in its original elements, one cubic inch of it is extended to 662 cubic inches of oxygen and 1,325 of hydrogen, or a total of 1,987—hence we perceive that, to form water, there is a condensation of original elements from nearly 2,000 in bulk to 1.

Railroads of the United States.

The first railroad built in the United States was the Quincy railroad, in Massachusetts, which was three miles long, and was used to draw granite from the quarries. The first railroad that employed steam power was the Mohawk and Hudson, between Albany and Schenectady. This road was comp'eted in 1833; it was built to cut off the tedious canal passage round by the Cohoes. The first locomotive used, we think, was an English one named "John Bull," which was imported for that purpose. That road is now greatly changed from its first route; it had an incline, with a stationary engine, for one mile; it is now continuous for the locomotive, and economy is the result. The number of miles of railroad constructed in our country since 1827, when there were only three miles in operation, is enough to excite both surprise and gratification in every American heart. In twenty-three years we have advanced from three miles of railroad (and that without steam power) to 7,677 miles. In 1840 there were 2,380 miles in operation, and in the latter part of 1850 there were the number of miles already stated in operation. No less than 3,297 were originated and put in operation during the last ten years. The nature of our country is most favorable for railroad enterprise. Although we have many mountains, yet we have so many vast and extensive plains, that our railroads are easily and cheaply constructed, in comparison with what they are in England, where every mile of railroad has cost nearly five times as much as ours. The abundance and cheapness of timber in our country, is another economic advantage, and a very important one in our favor. The first railroads built in our country were very poor in comparison with those which are now being, and which have recently been built. All the old roads, too, have been remodelled and renovated. Heavy rails, level and firm tracks, are now known to be the grand economisers of power, convenience, regularity, and expense. When we consider the position which our country occupies on the globe, in relation to Europe on the east, and Asia on the west, we cannot help looking forward to the time when the United States, by her railroads, steamships, and telegraph lines, will be the half-way-house between Western Europe, China, and Oceanica. In a very few years we shall have a line of telegraph to the Pacific, thus linking the Atlantic on the east, with the Great Ocean on the west, by lightning, for news, and at a period not far remote from the completion of the telegraphline, we will have a railroad for passengers and freight. We know something about the benefits of railroads and canals now, but we can scarcely anticipate the greater benefits that are yet to ensue from them to all classes. A time will yet come, we believe, when railroad tracks, (for short distances between populous cities) will be constructed of double the width of the common gauge, and huge cars and engines will transport thousands of people at once, as securely and comfortably as if sitting in their houses, from place to place, at a very small cost. After distant places of our country have been linked together, then attention will be keenly directed to local improvements—this will be the result as certainly as the sun shines.

We return our sincere thanks to A. C. Dodge, A. P. Butler, Thos. H. Benton and I. P. Walker, of the Senate, for valuable books and congressional favors, and to J. C. Dickey and Robt. Toombs, of the House, for similar favors.

Instructions have been given at Washington for the St. Lawrence to depart upon her voyage on the eighth day of this month, Saturday next.

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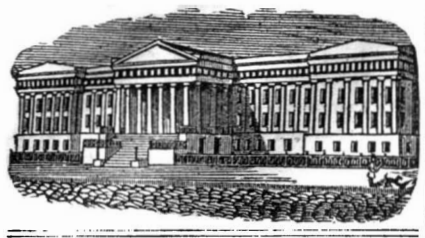

☞ Reported expressly for the Scientific American, from the Patent Office Records. Patentees will find it for their interest to have their inventions illustrated in the Scientific American, as it has by far a larger circulation than any other journal of its class in America, and is the only source to which the public are accustomed to refer for the latest improvements. No charge is made except for the execution of the engravings, which belong to the patentee after publication.

LIST OF PATENT CLAIMS
Issued from the United States Patent Office.

FOR THE WEEK ENDING JANUARY 29, 1851.

To Elisha Smith, of Albany, N. Y., for improvement in Stoves.

I claim the combination of a transparent water vessel, with covered or other transparent openings, in the top of a stove plate, and a mirror placed upon a stove top, as herein represented and described.

To F. N. Still, of New York, N. Y., for improvements in metal or second patterns for castings.

I claim preparing second patterns by moulding metal patterns in two part moulds, and then separating the two parts of the mould, the pattern being left in the sand, to cast a plate fitted to the metal pattern so moulding, as specified, so that the pattern can be attached to the plate, and the two be used in moulding, to produce castings, substantially as described.

To M. L. Knapp, of Painesville, Ohio, for improvement in Abdominal Supporters.

I claim the construction of hip springs, with split or divided ends, forming elongations of the same strip of steel, the front springs having slots and pivot holes, the backs springs having two or more graduating pivot holes, to be used in combination with the adjusting screws, as herein substantially as set forth.

To James Hanley, of New York, N. Y., for improvement in Swivel-ribbed Key.

I claim making the making the exposed ends of keys in such a manner, that they may revolve freely upon the other parts of the key, substantially in the manner and for the purposes described.

To Wm. Fields, Jr., of Providence, R. I., for improvement in the Hydraulic Ram.

I claim the hinge valve opening upwardly and inwardly, at or near the upper end of the inclined plane or drive pipe of the hydraulic ram, said valve being placed in a box made of brass, or any other suitable materials, which valve, by closing on the re-action of the water in the drive pipe prevents the said re-action from distributing the water in the spring or reservoir. The box of said valve is bolted to the drive-pipe, and said valve may be a hinge valve, or any other suitable valve.

To Alfred Hathaway, of Boston, Mass., for improvement in Pens for Ruling Paper.

Whatever may be the number of thicknesses of which the back bar and pens are composed, my improvement, and what I claim, consists in not only making the upper one larger than the others, but in making it the marking part, and soldering the next one below it, to it, as specified. Such improved mode of making the pen or pens, I claim as my invention, and whether the plates of metal placed upon one another be of different metals, or of different thicknesses of metal, as described.

And I also claim the improvement in the construction of the back bar, the same consisting in making it with a slit or opening, between any two pens, and extending nearly or quite up to the vertex of the angle or bend of the bar, as specified, the same producing the advantage above mentioned.

And when the pen is composed of more than two thicknesses of metal, I claim the improvement by which one single soldering of the upper and lower parts together, suffices to bind or keep all the parts together or in place, the said improvement consisting in making the lowest thickness of metal longer than any of the others, except the first, or upper, and marking one, as described.

And I also claim the method of making the pens and back bar, as shown, when the same are composed of two different thicknesses of metal, or of two plates of different metals, the said improvement consisting in making the lower plate to enclose or lap over the one or others above it, and thus make the back bar of one more thickness of metal, than the pens are composed of.

And I also claim to make the different thicknesses of the pen of different metals, as specified.

DESIGNS.

To Conrad Harris & P. W. Zoiner, of Cincinnati, Ohio, for Design for Stoves.

For the Scientific American.

Mechanical Principles.

MESSRS. EDITORS—I perceive that "Maclaurin," under his article in last week's paper, states that, "according to my reasoning a feather and a ball would fall with equal velocity," but he neglected to state that, according to his own reasoning, a feather of 10 ounces would fall with a greater velocity than a ball of lead 5 ounces: I say that two bodies of the same specific gravity, one large and the other small, will fall with equal velocity.

W. A. BLACK.

Philadelphia, Jan. 25, 1851.

[We will answer friend Black, and save Maclaurin the trouble of replying (if he would reply), as we den't like to occupy but little room with such a plain question. Maclaurin is right, for two reasons—1st, his reasoning did not go to prove that a feather of 10 ounces would fall faster than a ball of lead 5 ounces, but the reverse. 2nd—Mr. Black's premise that "two bodies of the same specific gravity, the one large and the other small, will fall with equal velocity," is an error, as Maclaurin has shown, in alluding to a piece of gold, which will fall with great rapidity if made into a ball, but if the same weight of the ball be beaten out into gold leaf it will be borne upon the breeze. This is plain, surely. Take a piece of iron weighing one pound, make it into a ball, and then take a pound of sheet iron and make it into a box of one cubic foot, and then let them drop at the same moment from Trinity Church steeple, would they both fall to the ground with the same velocity? No. The articles of Maclaurin are strictly philosophical in every point. If Mr. Black reads them over from No. 1, carefully, he will be convinced of the correctness of the premises there laid down. It is the resisting medium of the air which makes the difference in the velocity of bodies according to their form and bulk, whether of the same or different specific gravities.—ED.

For the Scientific American.

The Moisture of Rooms.

This is a subject in which all are concerned, particularly during the cold months of a northern climate, and perhaps attention has not been sufficiently drawn to a matter which must, in no small degree, affect the health of those delicate in constitution, and, if properly regulated, contribute to the comfort of all.

How delightful is the soft balmy air of a southern latitude! Its genial feeling conveys the delicious sensation of bathing in the atmosphere; and how strongly contrasted to the harsher air of a colder region. What makes the difference? Let us inquire into this question. If we chemically analyze the atmosphere of the zephyrs of the tropics, we find the air of precisely the same proportions in its constituent gases as the keen piercing winds of the boreal latitudes.

Then, it is not any variation in this respect which constitutes the difference; neither is it in the temperature, for, if so, then the warm air of our dwellings should rival the soothing atmospheres of Florida and Cuba, and consumptives would have but to remain in-doors during the inclement months, to derive all the advantages of climate, for which those regions are famed. There must be, then, some other causes than those above alluded to for the difference in question.

It is mainly, perhaps entirely, caused by the great difference in the amount of moisture in the two cases, supposing both to have the same temperature.

Cold air, even if saturated with watery vapor, when warmed up by admission to the lungs, becames of necessity very drying in its effects; for the quantity of moisture which the atmosphere is capable of absorbing and holding in solution being strictly dependent on its temperature, the same air which is loaded with aqueous particles at a low temperature becomes proportionably very dry at one more elevated. Thus the air of a room twenty feet in extent, by fifteen broad and twelve high, should have about one half gallon more of water dissolved in it at 80°, than at 32°, to keep it at the same relative state of moisture. Hence that additional quantity should be evaporated to preserve it in the same hygrometric state. But the atmosphere of a chamber is continually being renewed to supply that carried up the flue of the chimney by the action of the fire, and this must be provided for by the continual evaporation of a quantity of water necessary to be evaporated to preserve it in a salutary condition. The knowledge of this amount can be obtained only by experiment—by evaporating water until a hygroscope shall show the proper quantity required

The small vessels of water placed on the tops of stoves are insufficient; the quantity of vapor furnished by them is, in general, entirely inadequate—so small indeed that it is carried off by ventilation, nearly or quite, as rapidly as formed, and the hygroscope scarcely takes notice of the insignificant remainder; unless, indeed, the room be of contracted dimensions with the lungs of several persons exhaling a moist effluvia. This species of moisture, however, is contaminated with effete animal matter to a prejudicial extent, and should be avoided.

I have found the following arrangement efficient for the end proposed:—A tin box, two feet long and six inches deep, is suspended by hooks to the upper part of the fire-place, so high as not to intercept the heat of the grate, and having at each end a wrought-iron tube one and a half inches in diameter and eighteen inches long, soldered to its bottom, and extending down along the sides of the interior of the grate, some six inches into the burning coals; a handful of nails is put into each tube to prevent the noise of the ebullition. The tubes are the boilers, and the tin box the reservoir, holding about one and a half gallons of water; the box has a top, with a tin tube projecting six inches above, surmounted by a small funnel to fill the reservoir with, as well as to prevent the steam formed—which escapes through it—from being drawn into the flue of the chimney and lost.

I find by the hygroscope, described in a previous number of the Scientific American, that it requires the reservoir to be filled morning and evening; thus, in my chamber, of the dimensions above stated, three gallons of water are evaporated in twenty-four hours, and all this does not render the air as moist as that we breathe in summer, having the same temperature.

It may be observed that our rooms are very dry when no moisture is deposited on the cold panes of glass of the exposed windows, when the outside air is below freezing. It shows that the interior air would not be saturated with aqueous vapor, even if cooled down to that temperature, and hence, as previously explained, must be very drying in its effects.

A moderate degree of dryness is perhaps advantageous, in some cases, for the vigorous health of the system, but an excess should, if possible, be avoided. If a just medium cannot be obtained, the excess of moisture is probably the safer side, for sailors live constantly in the enjoyment of robust health, breathing continually an atmosphere overloaded with watery vapor.

At the proper season—in summer—I may again refer to the subject of the moisture of rooms in relation to the injurious effects of a cold dampness. FRANKLIN.

New York, January, 1851.

More than 6,500 persons met at Malone Franklin County, N. Y., a few days since, to consider the project of constructing a bridge over Lake Champlain.

TO CORRESPONDENTS.

"J. G. E., of N. C."—The patent of Mr. Hotchkiss expired on the 19th ult. We do not know whether the wheel, shaft, and crank are cast in one piece or not; his residence is Windsor, Broome Co., N. Y. Rose claims the conical flume "and making the buckets flare out from the back." It was patented in 1839. We are not able to give you the practical knowledge desired about the mulley.

"L. D., of N. Y."—It is best to have it recorded, for we suppose from your letter that the bargain is embraced in the assignment. We do not know of another such case, but it is best to be on the safe side, although the courts in Massachusetts have decided that such agreements come under the common law.

"J. H. R., of Ohio.—We do not know any such machine, except Stirling's Hot-Air Engine, described in Vol. 3, Sci. Am.

"G. B. A., of Philadelphia."—We do not know what kind of condenser yours is, but condensers for the same purpose have been tried before. Hall's condenser is well known. All have been failures, we believe.

"F. A. W., of Mich."—We have received yours of the 4th, and will give it attention.

"R. W., of Berl."—We saw a model three years ago, which was constructed nearly upon the principle embraced in your diagram. We do not believe that it will answer a good purpose. The great majority of accidents are caused by obstructions, very few by the curvatures.

"M. H., of Pa."—You have asked us a question which is very difficult to answer. The modifications of surveying instruments are very numerous, in fact are legion. We will give you our advice:—take it to a philosophical instrument maker, and if you find that its merits will cause it to be extensively used, then get it patented.

"J. W. A., of Md."—We believe that your stone facing hammer is patentable, and should be secured.

"J. B. L., of Waterloo."—Consult a physician at once; strong poultices of linseed meal should be applied in the mean time. We know of no better application.

"J. Y., of Pa."—As we understand it you could not get a patent on your gate; if we had a model we could judge better.

"C. E. K., of Pa."—We are sorry to say that we do not know of an artificial hand that would be of any benefit for your friend.

"H. K., of Mass."—We have never heard of the balls you speak of being used for incrustations. We think the composition patentable.

"R. L. L., of N. C."—There are various kinds of chain belts; we will try and get the information for you.

"G. H. S., of Pa."—We do not know the price of the transit instrument. They are made by J. W. Young, of Phila.

"J. W. R., of Ind."—The question embraced in your letter relates to one of economy. It would take some experiments to prove whether it is not more economical to have the diminished exhaust openings than to use steam direct from the power. In any case, the steam is the power, and if you take it from the boiler, it is lost in that respect. We do not know of a like arrangement to yours having ever been used before, and as something new we believe it to be patentable.

"Observus, of ——."—We would have published your article only it came too late for last week's number, and the debate for this week would be over before it could appear. Your views accord very nearly with ours on the subject. We have received a great many articles on the Patent Law Reform.

"W. L. N., of Ohio."—We have received so many articles on the subject of the Patent Laws, that we find it impossible to give yours an insertion.

"N. B., of R. I."—We do not know of a single work on submarine operations.

"M. W. H., of Ind."—Dealing in patent rights is a business in which we never engage. The procuring of patents is our legitimate business, but buying and selling, or disposing of patent rights on consignment, is out of our latitude. The $5 which you sent was the requisite amount for the engravings.

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"J. M. B., of Ohio."—Wo do not see any patentable novelty in your bedstead fastener, neither do we believe it infringes upon any existing patent. We cannot advise you to apply.

"S. M., of N. Y."—We cannot advise you to apply for a patent for your lathe gearing, as we do not believe one could be obtained. We have seen, essentially, the same principle before.

"I. L. D., of Ind."—No patent could be obtained for your churn. The balloon tube is common, and has been in several models in this office; the rest presents nothing new that we can see. Mr. T.'s claim relates entirely to the ribs arranged inside.

"H., of Clyde, N. Y."—The principle of your device being old, its application to a new purpose could not be patented. There is no combination upon which a claim could be sustained, as we view it.

"W. B., of Tenn."—Your request is received and declined, for the reason that the Navy Yard is a long distance from our office and we could ill spare the time from our business to attend to it. You will of course excuse us on this ground, as we would gladly oblige you if we had time to do so.

"A. D. B., of Geo."—The principle of the new modification of the press is good, but your claim will cover it as it now stands, as the change is simply in its mechanical construction, the essence of the patent not being affected. When in New York you will find our office open, so don't fail "to drop in, you will not intrude.

"H. A. F., of Mass."—There is, as you justly observe, an endless variety of churns, and hence it is difficult to give a positive opinion as to their patentability. We like the ideas embraced in yours, and do not know of any other precisely like it. The probabilities are that you could obtain a patent.

"T. F., of N.Y."—Artificial eyes for stuffed birds are sold by J. G. Bell, 289 Broadway. The prices vary from 3 cents to $3 per pair. By sending the name of the birds to Mr. Bell he will tell you the exact kind and price of the eyes you require.

"S. L. S., of Ohio."—The sketch of your improvement in grain drills is believed not to possess anything of a patentable character; sliding plates, moving through grooves for opening and closing the seed apertures, are very common in grain drills. We could not advise you to make application for Letters Patent.

"A. L., of Geo."—The remaining numbers of Ranlett's Architect have been sent. Please remit for the paper, as we do not open cash accounts with subscribers.

"J. A S., of St. Louis."—Your favor of the 17th enclosing $10 came safe, for which we are much obliged. We will attend to your business when you are ready to proceed.

"J. S. C. & Co., Ohio."—Patents can be extended to assignees as well as to the original inventor. It has been done.

"S. A., of Pa."—We do not know of anything to prevent you from obtaining a patent for your Apple Mill. The principle appears to be new and good. You can send us a model.

"W. A., of Charleston, S. C."—No patent could be obtained on the subject presented in yours of the 24th. We have seen the same thing done before, several years ago. Keep the secret if you can.

"E. E. M., of N. J."—Your coupling appears to be good, and so far as we know patentable.

"J. W. D., of N. J."—It would be impossible "to force a ball through a tube 100 miles long with occasional *curves*," by condensed air.

"J. R. C., of Mass."—We will sometime send you something about Australia.

"J. W. A., of Mich."—We believe your plan of friction to cure nervous disease to be good but it could not be covered by a patent so as to be of any precuniary benefit to you. If you wish us to mention it as a good application to a useful purpose, we will do so.

"G. K., of Va."—Should not think you could obtain a patent for your plan of constructing chimneys, elevated hearths are used.

Money received on account of Patent Office business, since Jan. 28, 1851:—

S. B., of Conn., $20; A. C. A., of Conn., $35; H. H. O., of Conn., $10; W. W., of N. Y., $30; W. & P., of Pa., $25; S. G. W., of N. Y., $46, and S. & L., of N. Y., $20.

Patent Claims.

Persons desiring the claims of any invention which has been patented within fourteen years can obtain a copy by addressing a letter to this office; stating the name of the patentee, and the year the patent was granted (adding the month of the year when convenient), and enclosing one dollar as fee for copying.

Standing Notice to Subscribers.

Henceforth, parties ordering the Scientific American will be supplied with the paper commencing at the time the order is received, unless they particularly mention that the back Numbers of the present Volume are desired. We have on hand over 3,000 sets of the Numbers already published, and shall be happy to furnish all new subscribers with complete sets whenever requested.

The present volume of the Scientific American will be the most valuable encyclopedia, or year book of inventions we have yet published, and every person ordering it should not fail to receive the back numbers, to render his volume complete.

Those desiring Volume 5 of the Scientific American, are informed that we are able to furnish a few complete volumes, (bound,) at $2,75 each. Also, we can send by mail sets complete, (unbound,) for $2. We would also say, that whenever our friends order numbers they have missed—we shall always send them if we have them on hand. We make this statement to save much time and trouble, to which we are subjected in replying, when the numbers called for cannot be supplied.

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Patent Office.

128 Fulton St.

NOTICE TO INVENTORS.—Inventors and others requiring protection by United States Letters Patent, are informed that all business relating to the procuration of letters patent, or filing caveats, is transacted at the Scientific American Office, with the utmost economy and despatch. Drawings of all kinds executed on the most reasonable terms. Messrs. Munn & Co. can be consulted at all times in regard to Patent business, at their office, and such advice rendered as will enable inventors to adopt the safest means for securing their rights.

Arrangements have been made with Messrs. Barlow, Payne & Parken, Patent Attornies, in London, for procuring Letters Patent in Great Britain and France, with great facility and dispatch.

MUNN & CO.,
128 Fultonstreet, New York.

THE NASHVILLE MANUFACTURING Company (chartered by the State of Tennessee) being now engaged in the erection of extensive machine works, wish to engage the services of a person thoroughly competent to manage the same. It is the intention of the Company to engage extensively in building locomotives, steam engines, &c. None but such as can furnish undoubted testimonials for skill, energy, and other requisites to fill the station, need apply. The Company also wish to employ a number of machinists, founders, &c., and would also receive propositions for the necessary tools, &c., for such an establishment. Immediate application, by letter or personally, to the undersigned, will meet attention.

S. D MORGAN, Prest. Nashville Man. Co.
Nashville, Tenn., Jan 17, 1851. 21 6*

TO LUMBER DEALERS.—Law's Planer having undergone important alterations, is now perfected and in successful daily operation, facing and matching at the same time, and in both respects, in a style not to be surpassed. The common objection that machines are expensive in repairs, is not applicable to these new machines—they are simple, strong, and easily kept in order. It is confidently believed that when they are well known they will have a decided preference over any other machine or mode of planing. Planing of all kinds done at short notice, corner of Water and Jay sts., Brooklyn. Law's Stave Machine dresses and joints staves of all kinds, shapes, and widths, by once passing through. Rights or machines for sale by H. LAW, 216 Pearl street, or after 1st March, at 23 Park Row. 21 8

LINEN AND HEMP MACHINERY.—I am prepared to contract with companies or individuals for the building of machinery by which linen can be produced as cheap as cotton, from either unrotted hemp or flax; also for making rope or bagging of unrotted hemp—the same machinery which I am now successfully using in the manufacture of kyanized cordage. O. S. LEAVITT.
Maysville, Ky., Jan. 23, 1851. 21 4*

NEW YORK, JAN. 16th, 1851.—We have appointed Warren Gale our Agent for the sale of A. B. Wilson's Sewing Machine rights in the State of Ohio. E. E. LEE & CO.

The Subscriber will open an office in a few days, in Cincinnati, for the sale of rights of A. B. Wilson's Sewing Machine. All orders for machines or rights can be addressed to me, at Cincinnati.
19 4* WARREN GALE.

WILLIAM W. HUBBELL—Attorney and Counsellor at Law, and Solicitor in Equity, Philadelphia, Penn.

PATENT RIGHTS FOR SALE—Goodman's Improvement for Turning Irregular Forms.—This machine has been patented about two years, and is well adapted to turning spokes, lasts, and handles; it differs from all other machines in having a combination of mandrels connected by gears, each of which holds one end of a stick to be turned, the other end being fastened by a common centre; over these hangs a cylinder, with cutters of sufficient length to come in contact with all the pieces to be turned, it being at right angles with them. Machines are now in operation which turn 4 spokes at a time, which will turn 50 an hour, leaving them better to finish than any other machine in use. For particulars, address DANIEL STONE, Dana, Mass. 18 5*

HUTCHINSON'S PATENT STAVE MACHINE.—C. B. HUTCHINSON & CO., Waterloo, N. Y., offer for sale town, county and State rights, or single machines, with right to use the same. This machine was illustrated in No. 2, Vol. 5, Sci. Am.; it will cut from 1,500 to 2,000 perfect staves per hour. We manufacture machines of different sizes, for keg, firkin, barrel and hogshead staves; also, heading shingle, and listing and jointing machines. These machines may be seen in operation at St. Louis, Mo.; Chicago, Ill.; Savannah, Ga.; Madison, Ia.; Ithaca, N. Y.; Waterloo, N. Y.; Bytown, C. W. Letters directed to us, post-paid, will receive prompt attention.
15 3m*

LEONARD'S MACHINERY DEPOT, 116 Pearl st., N. Y.—The subscriber has removed from 66 Beaver st. to the large store, 116 Pearl st., and is now prepared to offer a great variety of Machinists' Tools, viz., engines and hand lathes, iron planing and vertical drilling machines, cutting engines, slotting machines, universal chucks, &c. Carpenters' Tools—mortising and tennoning machines, wood planing machines, &c. Cotton Gins, hand and power, Carver Washburn & Co.'s Patent. Steam Engines and Boilers, from 5 to 100 horse power. Mill Gearing, wrought iron shafting and castings made to order. Particular attention paid to the packing, shipping, and insurance, when requested, of all machinery ordered through me. P. A. LEONARD.
15 3m

WANTED—By a Southern foundry and machine shop, in a healthy and desirable location, a man who is practically acquainted with, and fully experienced in the inside management and conduct of a foundry and machine shop. The establishment is large and requires for the office a man fully qualified as a designer and draughtsman, and thoroughly acquainted with, and experienced in engine and mill works of all descriptions. To a party who can furnish the very best testimonials from undoubted sources, of the highest qualifications, and who may render satisfaction, permanent employment will be given, none other need apply. A bond of five thousand dollars with approved security for faithful and competent discharge of duty will be required. The salary will be from $2000 to $3000, dependent upon the reputation, general experience, and character of the party. All communications will be regarded, strictly confidential. Address, with real name, post paid, box 664, New York City.

ALSO—An experienced and thorough Designer and Draftsman, for a Southern foundry and machine shop: one thoroughly versed in engine and mill work. 17 5 *

SCRANTON & PARSHLEY, Tool Builders, New Haven, Conn., will have finished 2 Power Planers ready to ship by the 1st of Feb., that will plane 9 feet long, 31 inches wide, and 24 inches high, with angle feed; counter shaft, pullies, and hangers, splining and centre heads, with index plate, and weigh over 5,000 lbs.; also 2 power planers that will plane 5 feet long, 22 in. wide, and 20 in. high, with counter shaft, pullies, and hangers, and weigh 2,400 lbs.—These planers are 25 per cent. lower than any others built. Cuts can be had by addressing as above, post paid. 19tf

1851 TO 1856.—WOODWORTH'S PATENT PLANING MACHINE.—Ninety-nine hundredths of all the planed lumber used in our large cities and towns, continues to be dressed with Woodworth's Patent Machines, which may be seen in constant operation in the steam planing mills at Boston, Philadelphia, New York, Jersey City, Williamsburgh, Brooklyn, Albany, Troy, Utica, Rome, Syracuse, Geneva, Rochester, Lockport, Buffalo, Elmira, Pittsburg, Jamestown, Gibson, Binghampton, Ithaca, &c. &c. The price of a complete machine is from $100 to $1,000—according to size, capacity, and quality. Persons holding licenses from the subscriber are protected by him against infringements on their rights. For rights to use these machines in the Counties of Queens, Richmond, Suffolk, and Westchester, and the other unoccupied counties and towns of New York, and Northern Pennsylvania, apply to JOHN GIBSON, Planing Mills, Albany, N. Y. 18 4*

WORLD'S FAIR, LONDON, in 1851—ANDREW P. HOW, Civil Engineer and Machinist, 35 Mark Lane, London, England. Mr. How is a native of the United States, in the above named business in the city of London. He offers his services to those of his countrymen who may have any kind of steam or other machinery to be exhibited at the Great Fair. He will, if required, receive it on arrival, and do all that may be necessary towards its erection, &c. References in New York—Thos. Sewell, 701 Broadway; Joseph Barton, 516 Grand st.
16 8*

CLOCKS FOR CHURCHES, PUBLIC Buildings, Railroad Stations, &c.—The subscriber having made important improvements in the apparatus for counteracting the influence of the changes of temperature upon the pendulum, and in the retaining power, together with a most precise method of adjusting the pendulum to correct time, are prepared to furnish Clocks superior to any made in the United States, both for accuracy of time-keeping and durability. They speak with confidence, from having tested their performance for several years. All clocks ordered and not proving satisfactory, may be rejected. Address SHERRY & BYRAM,
Oakland Works, Sag Harbor, L. I.

"Mr. Byram has established his reputation as one of the first clock makers in the world"—[Scientific American. 17 5eow*

PATENT DREDGE BOAT.—The subscriber having obtained a patent for improvements on the Dredge Boat, offers to sell rights to build and to use his Patent Dredge Boat in any part of the United States; the excavating apparatus consists of twenty scoops, preceded by plows receiving great pressure, and are capable of raising eight or ten cubic yards of mud or gravel per mmute; the scooping apparatus may be fitted on an old steamboat or other vessel, for the purpose of removing bars or other obstructions to navigation. A working model may be seen by calling on the subscriber. JAMES CALLAGHAN,
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WILSON'S SEWING MACHINE—New York Jan 17, 1851.—This is to certify that E. E. Lee, Esq., has made for our store several pairs of pantaloons, on his sewing machine, which we find to be done quite as well as is usually done by hand labor. G. P. & J. B. WILKINSON, Manufacturers of Clothes, 30 John st., cor. Nassau. 20 3*

DICK'S GREAT POWER PRESS.—The public are hereby informed that the Matteawan Company, having entered into an arrangement with the Patentee for the manufacture of the so-called Dick's Anti-Friction Press, are now prepared to execute orders for the following, to which this power is applicable, viz.—Boiler Punches, Boiler Plate Shears, Saw Gummers, Rail Straighteners, Copying and Sealing Presses, Book and Paper Presses, Embossing Presses, Presses for Baling Cotton and Woollen Goods—Cotton, Hay, Tobacco, and Cider Presses; Flaxseed, Lard, and Sperm Oil Presses; Stump Extractors, &c. &c. The convenience and celerity with which this machine can be operated, is such that on an average, not more than one-fourth the time will be required to do the same work with the same force required by any other machine.

WILLIAM B. LEONARD, Agent,
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MACHINES FOR CUTTING SHINGLES. The extraordinary success of Wood's Patent Shingle Machine, under every circumstance where it has been tried, fully establishes its superiority over any other machine for the purpose ever yet offered to the public. It received the first premium at the last Fair of the American Institute—where its operation was witnessed by hundreds. A few State rights remain unsold. Patented January 8th, 1850,—13 years more to run. Terms made easy to the purchaser. Address, (post-paid) JAMES D. JOHNSON, Redding Ridge, Conn., or Wm. WOOD, Westport, Conn.. All letters will be promptly attended to. 10tf

GURLEY'S IMPROVED SAW GUMMERS—for gumming out and sharpening the teeth of saws can be had on application to G. A. KIRTLAND, 205 South st., N. Y. 10tf

A CARD.—The undersigned begs leave to draw the attention of architects, engineers, machinists, opticians, watchmakers, jewellers, and manufacturers of all kinds of instruments, to his new and extensive assortment of fine English (Stubs) and Swiss Files and Tools, also his imported and own manufactured Mathematical Drawing Instruments of Swiss and English style, which he offers at very reasonable prices. Orders for any kind of instruments will be promptly executed by F. A. SIBENMANN, Importer of Watchmakers' and Jewellers' Files and Tools, and manufacturer of Mathematical Instruments, 154 Fulton street. 1 6m*

TO PAINTERS AND OTHERS.—American Anatomic Drier, Electro Chemical graining colors, Electro Negative gold size, and Chemical Oil Stove Polish. The Drier, improves in quality, by age—is adapted to all kinds of paints, and also to Printers' inks and colors. The above articles are compounded upon known chemical laws, and are submitted to the public without further comment. Manufactured and sold wholesale and retail at 114 John st., New York, and Flushing, L. I., N. Y., by
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FOWLERS & WELLS, Phrenologists and Publishers, Clinton Hall, 131 Nassau st., New York—Office of the Water Cure and Phrenological Journals. Professional examinations day and evening. 3 6m

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UNITED PATENT OFFICE IN PARIS AND LONDON.—GARDISSAL & CO., 9 Arthur st., west, city, London; Paris, 29 Boulevard St. Martin.—Procuration of Patents for England, Ireland, Scotland, France, and all countries; and transactions of all business relating to patents, (sale and licenses,) specifications, oppositions, &c. "The Invention," monthly journal, $1 a-year. 15 4m*

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THOS. PROSSER & SON, Patentees,
16tf 28 Platt st., New York.

STRAW CUTTER FOR SALE.—We have on hand one of Macomber's Improved Straw Cutters, patented Nov. 5, 1850, illustrated in No. 50, Vol. 5, Sci. Am. Price $10. Address MUNN & CO

THE SUBSCRIBER is now finishing four 14 horse engines, with boiler and apparatus all complete—price $1200 each. Several 6 horse engines extremely low; also, several of smaller capacity, complete; also, several power planers, now finishing.—Galvanized chain for water elevators, and all fixtures—price low—wholesale and retail. Orders, post-paid, will receive prompt attention. AARON KILBORN.
No. 4 Howard st., New Haven, Conn. 18 10*

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Scientific Museum.

For the Scientific American.

Bituminous Shale.

In addition to the notice you have taken in the Scientific American of the manufacture of bituminous shale, in England, to great advantage, I have observed the following notice of the same subject, by the London correspondent of the National Intelligencer:

"In England a company has been formed for the conversion, by distillation, of the Kimmeridge coal, or bituminous shale of Dorsetshire, into mineral oil or spirit, asphalt, and manure, so as to leave a profit of 100 per cent. on the expenditure. The manure, which is sold at £2 10s. per ton, has been tried on various crops with the most satisfactory results, and is said to be equal in its effects to guano, phosphate of lime, or any other artificial manure now in use. We may mention, in connection with these marvels of modern chemistry, that a company of gentlemen is now engaged in the neighborhood of Liverpool, is making experiments for the purpose of reducing the price of gas. These gentlemen speak with the utmost confidence of being able to procure from coal a much larger amount of gas than has hitherto been obtained, and also to get from the residuum products of very considerable value, so as, in fact, to enable them, if they chose, when the necessary apparatus was erected, to light a large town for nothing, and yet realize a profit. However, if they should succeed in reducing the price of gas 50 per cent. we shall be much indebted to them."

The principal object I have in view is to inform you that there is on the Miami River, of Lake Erie, inexhaustible quantities of Kimmeridge coal or bituminous shale, and lying in the most convenient situation for excavation and transportation. The bed of the Miami River passes some 30 or 40 miles over it, and in many places lies bare. The Wabash and Erie Canal also pass over it, parallel to the Miami River. The Anglaise River, a branch of the Miami, comes in at Defiance over this bituminous shale—the shale crops out in the bed of this for many miles. There are some places on the latter river where the shale has imbedded in it a large proportion of sulphuret of copper, in a pyramidial form—from the size of a pea, to that of a man's fist. It is principally *in situ*, although there is considerable lying loose on the surface. It is well known to mineralogists that the residuum, after burning, is clay. In some places the clay is a perfect white, this we think would make fine pottery. In general the clay appears to be stained by some iron contained in the stone.

B. F. Stickney.

For the Scientific American.

Crystalization.

The word crystal originally signified ice, but it was afterwards applied by the ancients to crystalized silica or rock crystal; because they considered that body as nothing else than water solidified by extreme cold. Chemists afterwards applied the name to all natural transparent bodies of a regular shape; and it is at present employed by them to designate the regular forms which solid bodies assume when their particles have full liberty to combine according to the laws of cohesion. These regular bodies occur very frequently in the mineral kingdom, and have long attracted attention on account of their great regularity and beauty.

Of all mineral bodies, the substances known as salts, most frequently take the crystaline form; and as they are mostly soluble in water, the chemist can, by solution and evaporation obtain crystals at his pleasure.

It has long been observed by chemists that each individual salt, or other crystalizable substance, affects a determinate form, which it will always take, if free to do so, on evaporation from solution, or cooling from fusion.

A few of the most common forms of crystalization are here given: common salt forms regular cubes; alum octahedrons; saltpetre, six-sided prisms; sulphate of magnesia (epsom salts), four sided prisms; this last contains upwards of fifty per cent. of the water of crystalization, which causes it to undergo the aqueous fusion when heated. Common salt contains no water of crystalization, properly so called, but some water is always mechanically included in its crystals. Dry salts, when heated, undergo the igneous fusion. Many ingenious theories have, at various times, been proposed by men of science to explain the phenomena of crystalization; the most satisfactory of which assumes that the minute invisible atoms of all substance have a particular form, and that, when forced to unite by the force of cohesion, this aggregation makes up the regular form which we call a crystal; and that this form is that which is possessed by its component atoms.

H. W. H.

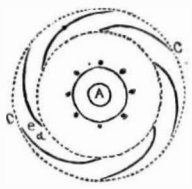
Claremont, N. H.

For the Scientific American.

Hydraulics.

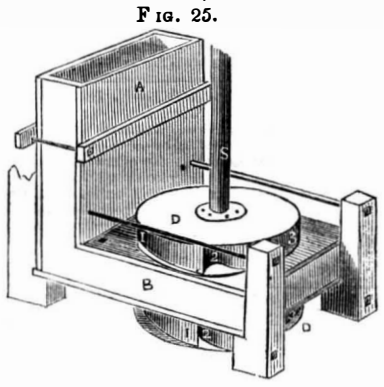
(Continued from page 160.)

Fig. 24.



Re-action Water Wheels.—About 300 patents have been granted for different kinds of water-wheels and improvements on the same. Owing to the loose way in which the Patent Office business was conducted previous to 1836, there is but too little known of the earlier American inventions. There can be no doubt but the same things have been patented over and over again. The first patent granted for a "Re-action Water-Wheel" was to Jas. McComb, of Princeton, N. J., in Aug., 26, 1791; the next to Joel Farnam, of Oswego, N. Y., in 1808; the next for wheels in the same class was to Zebulon Parker and Robert McKelvey, of Ohio, heirs at law of Austin Parker. This was in October, 1829, for a "Re-action and Percussion Wheel." All our American authors, with too little personal examination into the subject give Calvin Wing, of N. H., the credit of being the first American patentee, but his patent dates exactly a year after Parker's and 22 years after Farnam's. European authors have followed in their wake and copied the same mistake. The difference between the Barker Mill and the re-action wheel commences at the outset in the form of the wheel, as exhibited in the annexed figures, 24 and 25, of which the first is a horizontal section, and the second (25) a perspective view. A is the vertical shaft; C C are the curved buckets; these buckets are

Fig. 25.



narrower at the exit than inlet, as shown at *e d*. The water has free ingress on the face within, and rushes outwards to the circumference through the curved openings, impelling the wheel in a contrary direction to that of the water—hence the term *re-action*. The perspective view shows two wheels placed on one shaft. A patent was granted to Luke C. Hinman, L. Bissel, and Moses Barnes, of Otsego, N. Y., in June 11th, 1811, for employing two wheels at once. With the patents previous to Parker's and Wings, we can say nothing, but there is every reason to believe that the form of this double wheel was well known and in use, before the last war of 1812. In this perspective view, A is the water flume, or penstock; S is the vertical shaft; B is the feeding flume, D D are two water wheels; 1, 2, 3 are the buckets. The general and first opinions respecting this class of wheels was, that they were equal in effect to the under-shot wheels. As this wheel was driven by re-action and the under-shot by direct action, it was philosophically set down, that as *action and re-action were equal*, there could possibly be no difference in the effect, although there might be in the price, and the convenience of the re-action over the under-shot. This was an easy way to philosophise, and, as a whole, they were set down by Elwood Morriss, in 1833, as being only superior to undershot, for *running* in back water. In an experiment made by him, in that year, on a grist mill driven by a re-action water-wheel, and published in the Franklin Journal, he states, "the amount of water required was considerably larger than would have been needed by a breast-wheel to do the same work, and he was induced, upon the spot, to declare an opinion unfavorable to the economy of the re-action wheel under trial." He also states, that, although the proprietor was new-fangled with the wheel, yet he afterwards discarded it, and restored the old breast-wheel to favor and duty. This wheel nearly resembled the one in the above figure, and it took 1600 cubic feet of water, falling 1 foot per minute, for 60 minutes to grind and dress one bushel of wheat, he found that an under-shot required only 1576 cubic feet of water to do the same work. These were the conclusions set forth by Mr. Merris in 1842. They were condemnatory of American Re-action Wheels, consuming, as he stated, 24 cubic feet of water more than an under-shot wheel, in grinding one bushel of wheat; yea, in one instance, it is stated that they consumed nearly the double amount of water to produce the same effect, as an under-shot.

The Lead Mines of Iowa.

A correspondent of the Detroit Daily Advertiser, writing from Dubuque, Iowa, under date of the 12th inst., speaking of the lead mines near the city, says:—"I would give you a description of one of the heaviest lodes that has ever been struck in the mining country. The shaft enters a large cave, from twelve to fifteen feet high, and almost completely covered with mineral. There is one piece lying along the north wall, forty-eight feet long, and three feet square. On the north side, at the top, there is one of the finest sights I ever saw. There is an immense body, in square blocks, eight or nine inches square. This cave is eighteen hundred feet long, but the mineral does not show in the entire length. There is one more place which I must speak of. There are two sheets hanging down from the cap, about six feet ten or twelve inches thick, and sixty feet long. They are as white as snow. The cave is about fifteen feet wide, and, in most places, is completely covered, bottom and top. I think we can take out one thousand dollars worth a day, for twenty days in succession."

Stereoscopes.

Sir David Brewster, invented a new instrument about two years ago, of which the Abbe Moigno (the author of a good work on the telegraph) thus speaks in an article in *La Presse*.

"In his last journey to Paris, Sir David Brewster entrusted a model of his stereoscope to M. Jules Duboscq, a son in-law and successor of M. Soliel, and whose intelligence, activity, and affability will add to the already high reputation of the distinguished workman in the Rue de L'Odeon, No. 35. M. Jules Duboscq has set himself to work on the stereoscope with indefatigable ardour: without requiring the aid of a binocular camera, and by means of the ordinary daguerreotype apparatus, he has produced a great number of dissimilar (binocular) pictures, of statues, bas-reliefs, &c., &c.

His stereoscopes are constructed with more elegance, and even with greater perfection, than the original English ones; and while he is showing their almost miraculous effects to natural philosophers and amateurs who have already flocked to him in crowds, they are witnessed with a spontaneous and unanimous burst of admiration.

A number of these instruments are now being constructed in Scotland, but have not yet been introduced into America.

Durability of Vellum.

There are, in some of the public libraries of Europe, books composed of vellum, upwards of a thousand years old, which give no evidences of decay, and which may, unless destroyed by some accident, withstand the ravages of time for another thousand years with equal freedom from decay. Whatever might have been the process employed in preparing vellum during the earlier ages, it is certain, to say the least, that it has not since been improved. The ink of that period, too, is less liable to fade or decay.

LITERARY NOTICES.

Thomson's Mercantile and Professional Directory, for the States of Delaware, Maryland, Virginia, North Carolina, and the District of Columbia,—contains the name, location, post office address, and style of business of all mercantile firms, manufacturing establishments, attorneys, physicians, bankers, hotel keepers, etc., in the States named above; to which is appended an advertising register. Published by Wm. Thomson, No. 6 Carroll Hall, Baltimore; for sale in this city at Phelp's Map Store, 189 Broadway; Wm. H. Fagan, agent for New York. This valuable directory embraces over 300 pages of well printed matter, the character of which is given above. It has been compiled with great care and expense, and the publisher deserves success. We doubt not but that the work will have an immense sale, as it should, among our business community. Price $2.

The International Magazine, for February, contains a sterling variety of literary matter, original and selected, besides a portrait of Thomas Chatterton, and several scenes connected with his career. The accompanying article is highly interesting and instructive. This Magazine is one of the first in the world, and deserves a wide circulation. Published by Stringer & Townsend, at $3 per annum. Single numbers 25 cents.

The February number of Sartain's Magazine is most beautifully embellished with fine steel and wood engravings. The contributions are thirty-five in number, from our most able literary characters, and embrace 72 pages, finely printed. The general arrangement of this serial is highly creditable to the publishers, and deserves a liberal patronage from American ladies, to whose interests it is mainly devoted.

The February number of Harper's New Monthly Magazine contains Oliver Goldsmith's celebrated poem, "The Traveller," illustrated superbly by clever scenes, admirably drawn, to correspond with the description. This feature in the New Magazine is most excellent, and we trust the enterprizing publishers will continue it. We have several times thought how finely Burn's "Cotter's Saturday Night" could be represented—as a descriptive poem it has no superior. In genuine interest and merit, this number is superb, the selections being of the first class of literature.—Price 25 cents per single number; Harper & Brothers, publishers, 82 Cliff st.

No. 5 of "The Daguerrean Journal," by S. D. Humphrey, N. Y., is received, and contains several valuable articles upon the subject to which it is devoted. Published semi-monthly at $3 per annum.

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